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ABSTRACT

The purpose of this notebook is to assist educators who are designing and implementing inservice education programs to facilitate the effective use of computer integrated instruction (CII) in schools. It is divided into the following five sections: (1) Effective Inservice (a brief summary of inservice literature focused on inservice dimensions and design principles); (2) Background Information (an overview of computers in education and a discussion of the roles of computers in problem solving); (3) Initiating/Planning an Inservice (suggestions for preliminary planning and activities and a sample timeline for those activities); (4) An Eight-Session Social Studies Inservice (2-hour sessions cover an introduction to databases, database management systems, making your own database, an introduction to computer simulations, another simulation, teacher productivity tools, graphing to represent data, and problem solving, telecommunications, and closure); and (5) Instruments and Evaluation (a variety of instruments for needs assessment, formative evaluation, and summative evaluation). Each 2-hour science inservice session contains some or all of the following: narrative overview, script (topics, objectives, materials, activities), timeline, handouts, and readings. References are listed throughout the notebook and a software bibliography is included in section 4. (DB)

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ED325108

COMPUTER-INTEGRATED INSTRUCTION INSERVICE NOTEBOOK: SECONDARY SCHOOL SOCIAL STUDIES*

ISTE

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- Chairman of the Association for Computing Machinery's Elementary and Secondary School Subcommittee, 1978-1982.
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COMPUTER-INTEGRATED INSTRUCTION INSERVICE NOTEBOOK: SECONDARY SCHOOL SOCIAL STUDIES[*]

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[**] Not all staff members worked specifically on the social studies inservices. A number of volunteers also contributed to this project. Ron Gerton made significant contributions to this Social Studies book.

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- Narrative overview
- Script
- Timeline
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PREFACE

The purpose of this notebook is to assist educators who are designing and implementing inservice education programs to facilitate the effective use of Computer-Integrated Instruction (CII) in schools. CII involves the use of the computer as a problem solving tool. CII includes the use of applications such as databases, graphics, spreadsheets, telecommunications, and word processors; these are generic applications in the sense that they can be used in many different subject areas and grade levels. CII also includes use of special purpose software designed to help solve the problems occurring in specific courses or disciplines.

This notebook was prepared by the staff of NSF Project TEI 8550588, which received three years of funding beginning September 1985. It is one of four notebooks to be prepared that include:

- CI^3 Notebook for Elementary School
- CI^3 Notebook for Secondary School Mathematics
- CI^3 Notebook for Secondary School Science
- CI^3 Notebook for Secondary School Social Science

The problem addressed by this NSF Research and Development Project is the disparity between the overall capabilities and potentials of CII and the current implementation levels of CII in our schools. There is strong support from computer-knowledgeable educational leaders for increased use of CII.

Growth in appropriate use of CII depends on schools having:

1. Access to appropriate hardware.
2. Access to appropriate software.
3. Access to appropriate curriculum and instructional support materials.
4. Appropriately trained teachers and school administrators who support increased use of CII.

The cost of computer hardware continues to decline even as its capabilities continue to increase. The amount of computer hardware available for instructional purposes is now sufficient to have a significant impact on schools. Moreover, hardware availability is continues to grow very rapidly. This project assumes that the problem of hardware access will gradually diminish; thus, this project does not focus on the hardware problem.

The quantity of educational software is continuing to grow, while the average quality continues to improve. A 1986 estimate suggested that there were about 10,000 educationally oriented, software programs for microcomputers commercially available. *The Educational Software Selector*, published by EPIE, lists nearly 8,000 titles. The amount and quality of CII software now available is adequate to support extensive use of CII in schools and to have a major impact on school curriculum. The educational market is large enough to support a viable, competitive industry with many companies participating.

This project does not focus on the overall problem of educational software. However, each Notebook contains information about a number of pieces of educational software. To the extent possible, the focus is on currently available generic CII software. In cases where more specific pieces of CII software are discussed, they were selected because they are readily available, and are apt to remain so for some years to come, and because they fit the specific instructional needs of the authors of these notebooks.

Instructional support materials include textbooks, workbooks, and reference materials; films, filmstrips, and video tapes; and course goals, course outlines, and teacher support materials. Although there is a substantial amount of instructional support material for learning/teaching about computers (teaching computer literacy, computer programming, and computer science), the amount of instructional support materials for CII is still quite limited. This project includes the development of a modest amount of CII teacher support materials; a number of sample lesson plans have been developed and are included in the notebooks, for example. It is not, however, a major goal of this project to develop CII instructional support materials.

The NSF Research and Development project focuses on the development of effective methods for the inservice education of educators interested in CII. The materials contained in the notebooks are intended for computer education leaders who are designing and implementing CII inservice education workshops and courses. Each notebook contains a detailed outline of an eight-session workshop along with support materials. A number of "Copy Me" pages are included for dissemination in an inservice workshop or course.

It is recognized that designers and deliverers of inservice education vary widely in their experience, computer background, and academic area of specialization. With this in mind, two general methods are envisioned for using the materials in these notebooks. First, an inservice provider might rely heavily on a particular notebook, following it closely in giving a sequence of workshops or a course. Second, an inservice provider might use these notebook materials to get ideas and to serve as resources in designing and presenting CII instruction to educators. In either case it is expected that the inservice provider will benefit from use of the notebook materials and will learn some new ideas about effective inservice and CII.

This notebook presents a particular philosophy of inservice education. It is a process-oriented philosophy, as distinguished from a content oriented philosophy. Thus, an inservice education program based on this Notebook will look quite different from the traditional computer-oriented inservices that have been widely presented in recent years. The resulting inservices are fun to lead and fun to participate in. They are an effective way to encourage the increased and appropriate use of computer-integrated instruction in schools.

How to Read and Use This Notebook

The purchaser of a single copy of this Notebook receives a print copy and a copy in MacWrite format on 800K Macintosh disks, and a single user site license.

The single user site license gives the one person who is designated as the "Primary User" of the site license the right to make copies of all of the materials in this book for classes he or she teaches. If the single user site license is purchased by a school or school district, the intent is that one person be designated as the "Primary User." If several people are to teach using this book, a multiuser site license should be purchased. The right to copy materials from the book does not transfer to participants in classes taught by the "Primary User."

Information about purchasing a multiuser site license can be obtained from the publisher, the International Society for Technology in Education, 1787 Agate Street, Eugene, Oregon 97403.

The disk copy is organized into folders, sub folders, and individual files in a systematic and relatively logical fashion. At the bottom of each page of the print copy there is information that will help you locate the appropriate file on disk. The typical footer consists of three parts:

Brief title of the book: CI^3 Notebook
File name: This is explained in more detail below.
Page number within the specific file: Each file is numbered sequentially starting at page 1.

The name of an individual file is two or three digits, separated by periods, and a brief title. You will notice that the name of the file you are currently reading is 0.4 Read and Use. The first digit of the sequence is a folder number. This file is in folder number 0. The second digit refers to a particular file within the folder unless there is a third digit. If there is a third digit, the second digit refers to a subfolder number, and the third digit to a file within that subfolder.

This notebook contains a great deal of information to aid you in conducting an effective inservice for integrating computers into the curriculum. Most readers will want to skip around in the material, rather than reading it from cover to cover. This section is a guide to help such readers by presenting a brief summary of each section and how and when to use it.

Section 1: Effective Inservice

Substantial literature exists on effective inservice. This section of the Notebook contains a brief summary of the effective inservice literature followed by a discussion of the CI^3 model for the inservices designed for this NSF project. We recommend that you read all of this section.

Section 2: Background Information

The first part of this section is a general overview of computers in education. It might be used as a handout at an inservice for educators who have not had previous coursework or extended workshops on computer uses in schools.

The second part of this section discusses the roles of computers in problem solving. This is essential background information for all inservice presenters. It can also be used as a handout for workshop participants.

Section 3: Initiating/Planning an Inservice

This section offers a few suggestions to consider when beginning to plan an inservice. Novice inservice organizers will want to read this section.

Section 4: An Eight-Session Social Studies Inservice

The inservice described in this Notebook is eight sessions of two hours each. Although the information included can be presented in eight session, there is enough material for nearly 16 sessions if desired. We suggest that you carefully read through the materials for the first session to get the general idea of the information presented.

Session 1: Introducing Databases. In the first half of this session, we will use a tutorial that will introduce some of the basic features of the **Bank Street School Filer.** The last half of the session will be devoted to having participants and staff get acquainted as well as outlining the nature of the term project and other general concerns of the next seven weeks. Note that in 1988 Bank Street published a Bank Street School Filer workshop manual. It contains substantial material that would be useful in the first few sessions.

Session 2: Database Management System. During this session we will continue to explore the educational uses of databases using **Bank Street School Filer** and **United States Data Base.** The emphasis will be on examining the uses of databases in developing higher order thinking and critical thinking skills.

Session 3: Make Your Own Database. Using **Bank Street School Filer**, we will explore how to develop our own databases. We will discuss some of the possible on-computer and off-computer educational benefits in developing our own databases. We will conclude this session by discussing and analyzing some of the major ideas covered in the previous sessions.

Session 4: Introduction to Computer Simulations. We will examine the use of simulations in the classroom. Using **President Elect** as one example of a simulation, we will explore the presidential election campaign. The deeper questions concerning computer simulations and their educational uses will be examined.

Session 5: Another Simulation. This session will examine how a simulation can be used to teach problem solving and critical thinking skills and enhance the transfer of learning. The focus will be on the way simulations can be used to develop communication skills and decision-making abilities.

Session 6: Teacher Productivity Tools. We will use utility programs such as a computerized gradebook, *Timeliner*, and perhaps other pieces of software as we examine the role of utility and other teacher productivity programs in education. The emphasis will be on types of software that teachers use in preparing lessons, keeping records, retrieving information for their own use, etc.

Session 7: Graphing to Represent Data. During this session we will look at using the computer to graphically represent quantitative data in the social studies. Using **MECC Graph** and/or **Easy Graph II** we will explore using graphs to represent quantitative information by bar, line, circle, and pictographs. As in the earlier sessions, problem solving will be a central theme in this session.

Session 8: Problem Solving, Telecommunications, and Closure. How can computers be used to help teachers develop their students' thinking skills? What are some important computers issues in social studies education? These questions and others will be examined along with a brief look at telecommunication systems.

Section 5: Instruments and Evaluation

The NSF project used a variety of instruments for needs assessment, formative evaluation, and summative evaluation. Copies of these instruments and a discussion of some of the results are included in Section 5. The NSF project inservices placed considerable emphasis on formative evaluation, and we recommend that workshop leaders do likewise. Such an emphasis will help workshop leaders adjust their presentations to meet the needs of participants.

Readers are also encouraged to study Seymour Hanfling's doctorate dissertation, which was completed in the fall of 1987. Hanfling's work focused on formative evaluation of the NSF project. His dissertation was directed by Dick Rankin (the project evaluator) and Robert Sylwester. It provides substantial information about the effectiveness of the project during its first year. Additional detailed information on the long term effects of the project are discussed in Vivian Johnson's doctorate dissertation completed in summer 1988 under the direction of Dick Rankin and Dave Moursund.

EFFECTIVE INSERVICE

1.1
What the Research Literature Says

Change is difficult. It is difficult to imagine, difficult to plan for, difficult to implement, difficult to manage, and difficult to measure. Fullan (1982) states that, in the educational context, "change involves 'change in practice'" (p. 30) and he demonstrates several difficulties. For one, change is multidimensional; new materials, new teaching approaches, and alteration of beliefs must be considered.

Inservice training is a major tool in the implementation of educational change. In reporting a research-based model for such training, (Gall & Renchler 1985), the authors state, "No one yet pretends to have discovered all the elements that make staff development programs completely successful" (p. 1). One reason for this is the difficulty in designing studies that can "tease out" the effective practices from the background noise of incidental and uncontrolled effects. The most reliable measure of effectiveness—change in student behavior—is several steps removed from the major actions of most staff development programs. Joyce and Showers (1983) describe a model involving classroom-level coaching that promises to take the training all the way to the level of observation of actual classroom practice, but such designs are rarely implemented due to limitations of time and funding.

Because change takes time and is best viewed as an ongoing process, the internal state of the learners—in this case, teachers themselves—is an important consideration. Hall (1982) showed that it is desirable to match inservice to current levels of concern of the individual participants. Furthermore, continued tracking of the evolution of their level of concern can function as a diagnostic tool for modifying the content of training "on the fly," should modifications be necessary.

The literature on inservice designs that are specific to computer education is sparse. Gabel (1984) reviews the work of Isaacson (1980), Winner (1982), and Ferres (1983), and finds, that their essentially descriptive studies do not speak to the issue of effectiveness, but instead concentrate on the mechanics of developing and presenting special purpose inservice training. Gabel's own work concluded that the model suggested by Gall and Renchler (1985) was a valid and useful framework for organizing computer education inservice.

In this section, the categories for the dimensions of inservice follow those outlined by Gall and Renchler (1985) and are divided into five categories: content and organization, delivery system, organizational context, governance, and evaluation.

Inservice Dimensions

Content and Organization. The realm of the planning, development, delivery, and follow-up of actual training sessions is below the level of more global concerns such as the environment in which inservice is provided, the goals and standards of the institution whose teachers are being educated, or the measures by which the inservice program is to be evaluated. Of course, these global issues have great impact on the training to be delivered. For example, the environment may determine the resources, timing, extent and depth of the program. The goals and standards of the institution (e.g., a school district) should strongly influence (if not actually determine) the content of the program. The measures of evaluation may direct the attention of the trainers to emphasize more closely monitored elements of the program at the expense of other elements less emphasized by the evaluation instruments.

Nevertheless, the actual conduct of an inservice may be separated from these other concerns, and a large body of literature (accompanied by a much smaller body of research) is available for inspection. The predominant feature of the literature is that it is generally based upon common practice, rather than upon actual research. In fact, the *management* and *evaluation* of inservice training is more thoroughly researched than the *conduct* of inservice.

Gall and Renchler (1985) identified the dimensions of methods of delivering an inservice:

1. Readiness activities. What actions are taken prior to the conduct of training to raise teacher awareness of the importance of the inservice program? How are school leaders prepared for their roles in the training? What participant information is gathered before the program begins?
2. Instructional process. What training methods will be used to help teachers acquire the target knowledge and skills?
3. Maintenance and monitoring. What provisions are made to observe and measure the actual level of application of the content of the training to classroom practice?
4. Training site. Is the training best carried out at the school site, or is another location more appropriate?
5. Trainers. What trainer characteristics may impact the effectiveness of the training program?
6. Scheduling. What duration, spacing, and timing should the training program have?

Competently designed inservice training programs will address each of these dimensions. The usual practice of trainers is to give great attention to the instructional process, scheduling and their own preparation.

An additional question to be addressed might consider any practical distinctions that exist among different types of learners. Are adults in general (and teachers in particular) sufficiently different from other learners that exceptions or refinements must be made to the well-researched principles of learning? (see Gagné, 1977) Although the most general of these learning principles remain intact, researchers such as Knowles (1978) have determined that adult learners are sufficiently different from children as to merit distinct consideration. Among the important features of adult learners cited in Knowles' work are that:

1. Adults learn by doing; they want to be involved. Mere demonstration is usually insufficient. Practice and even coaching are highly desirable.
2. Problems and examples must be realistic and relevant to them *as adults*.
3. Adults relate their learning very strongly to what they already know. They tend to have a lower tolerance for ambiguity than children, so explicit attachment of new knowledge to their existing base is a paramount necessity.
4. Adults tend to prefer informal learning environments, which are less likely to produce tension and anxiety.
5. Changes in pace and instructional method tend to keep the interest of the adult learner high.
6. Unless the conditions of training absolutely require it, a grading system should be avoided. Checklists of criteria met in the course of training, for example, are less intimidating than the assignment of grades.

7. The instructor should frame his or her role as that of a facilitator of learning rather than as a font of knowledge or expertise. This guarantees that participants will find the trainer approachable, an absolute precondition of communication between adult learner and teacher.

It is obvious that these adult learner characteristics are of great concern to the teaching of adults and they should govern several aspects of the preparation, delivery, and follow-up. The impact of these elements of training is discussed below in summary with lessons learned from other sources.

In a study of the impact of inservice on basic skills instruction, Gall et al. (1982) identified a number of deficiencies in the ordinary conduct of inservice:

1. Programs tended to be focused on the professional goals of individual teachers rather than on the improvement of the school instructional program. Teachers' goals and school needs are not always in consonance.

2. One-shot training or short sessions failed to show impact on the school's instructional program.

3. Although the inservice programs were sponsored and financed by districts or schools, the general plan and learning activities of the training were based on goals and objectives that had little or no demonstrable connection to those of the school or district.

4. Programs were very rarely assessed on the basis of actual improvement of student performance.

5. Most inservice programs lacked several of the following desirable features: readiness activities, a meeting, follow-up activities, and in-classroom observations to identify changes in teacher behavior that might be attributed to the inservice training.

These researchers judged that programs exhibiting such deficiencies will have little impact on teacher practice or student performance.

Much of the work of Joyce and Showers (1983) centers on governance issues, but they also have critical points to make concerning the conduct of inservice:

1. Training may be considered to be composed of levels of involvement: lecture, demonstration, practice in the training environment, practice in the target environment, and coaching in the target environment.

2. Generally, lecture and demonstration have little impact in terms of changing teacher behavior.

3. Practice (following lecture and demonstration) contributes greatly to change in teacher behavior.

4. Coaching (following lecture, demonstration, and practice) not only contributes further to change, but also creates opportunities for dissemination of an innovation or desired practice throughout the unit (e.g., department, school, or school district) in which change is desired. One of the most promising of these opportunities is peer coaching.

Echoing elements of both Knowles (1978) and Joyce and Showers (1983) are some of the findings of the Florida State Department of Education (1974):

1. Inservice programs that place the teacher in an active role are more likely to accomplish their objectives than those which place the teacher in a receptive role.

2. Programs that emphasize demonstration, supervised trials and feedback are more successful than those that simply present new ideas or materials to teachers without opportunities for practice.

3. Programs in which teachers share and provide mutual assistance to each another are more likely to succeed than those that fail to encourage interaction during and after training.

4. Self-initiated and self-directed training activities (although seldom used in inservice education programs) are associated with successful accomplishment of program goals.

The literature offers many similar indicators of success or effectiveness in inservice conduct. They are briefly summarized as follows:

1. The content of inservice education programs should be directly and immediately linked to the goals of the agency sponsoring the training.

2. The characteristics of teachers as adult learners should be taken into account when inservice education activities are designed. In particular, the activities should be relevant to them as adults, new knowledge should be explicitly connected to previous knowledge, an air of informality should predominate, grading systems should be avoided, and the trainer should act as a facilitator.

3. Designs that feature multisession contact and development of an ongoing relationship between trainer and teacher is preferred over one-shot designs.

4. If possible, the training should include not only presentation of information and demonstration of new methods and skills, but also supervised practice and coaching.

Organizational Context. When referring to the organizational context in which inservice education occurs, Gall and Renchler (1985) echo the "modal systems" of Joyce and Showers (1983). While Gall and Renchler recognize the five modes identified by Joyce and his colleagues, they prefer to think of these modes as representing different functions of inservice education and go on to identify four such purposes: (a) inservice for personal professional development; (b) inservice for credentialling; (c) inservice for the purpose of induction into the profession; and (d) inservice for school improvement.

"Inservice for school improvement" speaks directly to the school as an organization. Operationally, one can define the organizational context as those organizational elements of the school that directly influence the success of inservice education. But organizational context also implies a series of interrelated components that work in relative harmony. To divorce any one component from the whole distorts our perception of and reaction to that element. Just as our perception of our environment is continuous, so the school must be viewed holistically as a continuous, dynamic collection of interlacing and interactive parts.

A meta-analysis done by Lawrence and Harrison (1980) concludes that the most effective inservice programs address the school as a unit. Their research supports the contention that inservice is most effective when the emphasis is on global goals rather than personal development.

These findings are consistent with the observation of noted anthropologist Edward T. Hall (1981) about the essential nature of the context of expression and action. He states that context determines everything about the nature of the communication and predicates further behavior. A focus on school improvement places the "situational dialect" of the teacher professional life of the teacher within the larger frame of the school as a complete unit. This broad focus of shared goals gives a context of discussion in harmony with the larger organizational context. A somewhat different but complementary observation is made by Pitken (1972) when she examines the question of social membership. She notes that with respect to learned or cultural norms, the wholeness and uniformity of our society is determined by the acquisition of like patterns by people exposed to them. These views lead again to the conclusion that the more consonant the goals are with the school, the more consistent will be the patterns of compatibility between the behavior elicited and those expressed by the administration and support staff. In essence, the new behaviors or activities must mirror the intentionality of the school as a unit.

If we place the goals of the inservice within the larger framework of the school environment and provide a collegial support structure, chances of institutionalizing any changes are improved. In a fundamental sense, the organizational context provides the ecological gestalt of action and interaction. Compatibility between the objectives of the inservice and those of the school is essential if changes are to be made a part of the taken-for-granted background of the teacher, administrators, and support staff in their daily activities.

Holly (cited in Gall & Renchler, 1985) surveyed 110 teachers and found a general preference for activities that allowed them to work with other teachers. Ngaiyaye (cited in Gall & Renchler, 1985) found that teachers preferred to work with teachers who had similar educational duties. Domain-specific knowledge as defined by Doyle (1983) consists of an explicit semantic network of relevant information and identified methods or strategies for applying that information. Although Doyle was addressing academic content, it seems clear that the same theme can be applied effectively in inservice education. Thus, not only does educational research support the need for teachers to work with teachers, but it supports a more specific domain of discourse in which they share their goals and concerns with teachers in their own or similar subject areas. In a collegial environment made up of their peers, teachers can relate common concerns and share methods or strategies central to their needs as educators (U.S. Department of Education, 1986). Furthermore, teachers with similar instructional assignments can share materials, tools, and new methods of instruction.

Unfortunately, there appears to be no research examining the relative effectiveness of variations in teacher inservice groupings as defined by Gall and Renchler (1985). Wade (1985), however, does indicate in her meta-analysis that participation by both secondary and primary school teachers is more effective than either group working alone.

In an organizational context, the school principal as an instructional leader plays a major influential role. Research by Louchs and Pratt (cited in Gall & Renchler 1985) indicates that the role taken by the principal in the implementation efforts of a program is essential to the success of the project. Leithwood and Montgomery (cited in Gall & Renchler 1985) have shown that an effective principal will participate in at least part of the inservice workshops attended by the staff. Finally, the Rand study (cited in Gall & Renchler 1985) suggests that without the approval of the principal, teachers generally will not implement a new curriculum or process.

As noted above, the school is a dynamic but loosely coupled organization. This loose coupling requires a mediating force that lends a coherence to its structure. Thus, the principal seems to act as a lens to keep school goals clearly in focus and as a guide to keep teachers on track with district objectives (U.S. Department of Education, 1986).

Governance. The issue of governance frames the larger context of school as a functioning unit. Operationally we can define governance as that organizational process of decision making that determines school policy and directs school resources. The governance of inservice education specifically addresses concerns about the way an inservice will be designed and offered to the district staff. The study by Mertens (1982) clearly shows that the view of the teacher as a professional must pervade the district; when teachers are viewed as professionals, inservice projects are more successful than when teachers are viewed merely as functionaries. All projects and or policy decisions need to be approached in this light.

There appears to be no research on the most effective infrastructure for carrying out the process of governance at the district level. However, there is ample research to indicate that this process must take into account teacher concerns and expectations. Many researchers indicate that the teacher must be given the opportunity to be part of the planning. If teachers are not consulted, the results can be disastrous. Wolcott (1977) documented a carefully planned effort for educational change in a school district in Oregon. This mammoth seven year plan involving several hundred thousand dollars, vast district resources, and uncounted hundreds of hours for both planners and teachers failed. Its primary failure was that it did not take into account the needs of the educator. It was conceived as a "top-down" approach and implemented as such.

Wolcott reaffirms the importance of teacher participation in the planning process. What is not clear is how much control teachers should have over the inservice content. On one side is the work of Schurr (cited in Gall & Renchler, 1985), where it is shown that teachers desire input into the planning process; on the other side is the work of Wade (1985) that indicates inservice sessions were gauged as "less successful" if participants were regarded as the major contributors to the process. Indeed, her meta-analysis shows that inservice sessions are more effective if the leader assumes the role of "giver of information" and teachers as "receivers of information." Clearly, a balance seems necessary. It is important to ascertain the needs of teachers so that inservice sessions can be directed specifically to their needs. On the other hand, the integrity of the inservice content must be maintained, with policy and planning decisions attempting to strike a balance between teacher input and district needs.

Another issue of governance is the recruitment of participants. Motivation to attend inservices can be subtly but definitely enhanced if the research outlined in this section is taken into account. A feeling of personal connection with the concerns of the inservice is also important. Moursund (1988) suggests that ownership in a problem-solving process is critical. Inservice by definition is a form of problem solving. If participants can feel a sense of ownership of the content of the inservice, they will want to attend and take seriously the purposes of the project.

Wade (1985) confirms the need to have a sense of ownership, pointing out that inservice is more successful when the teachers are given special recognition for their involvement. But she further reports that projects are more successful if teachers are either designated to attend or selected on a competitive basis. Clearly, the research confirms the need of teachers to be a willing part of the process, but it also indicates that directing teachers to attend is not predictive of failure. Obviously, this is a complex issue: *How* teachers are directed to attend is important; the content and relevance of the inservice is important; the organizational context is important; and the way the issue of governance has been handled in the school is historically important.

Other incentives for attending inservices described by Betz (cited in Gall & Renchler, 1985) are release time, expenses, and college credit. Administrators, however, can take heart in Wade's (1985) finding that almost any inservice can make a difference. She reports that inservice of any kind, on the average, resulted in half a standard deviation greater positive change than control groups. This is a clear indication that inservice education can influence the quality of the education.

In summary, effective inservice must take into account the school organizational context and its governance policies. It appears that the more the inservice speaks to the unifying goals of the school, the more effective will be the results.

Evaluation. As stated in Gall and Renchler (1985): "The evaluation of inservice programs is not a well-developed field," and "... systematic evaluation of inservice programs is the exception rather than the rule" (p. 30). In an effort to bring some order to the field, Gall and his colleagues (1976) attempted to define the different levels at which inservice training might have effects. They defined four levels:

Level I: Implementation of the inservice program. (Measures of the quality of the training itself.)

Level II: Teacher improvement. (Measures of actual change in teacher behavior in the classroom.)

Level III: Change in student performance. (Measures of the degree to which improvements in teacher performance lead to improvements in student achievement.)

Level IV: Changes in the environment. (Measures of changes in the school that may be indirect [or even unintended] results of the inservice program.)

The further away we get from measuring the direct delivery of training, the less certain we can be that changes in Levels II, III, and IV are actually attributable to the training program. Other factors, unpredicted and unmeasured, may have greater impact than training.

At Level I, the elements mentioned previously in the Content and Delivery System section (readiness activities, instructional process, maintenance and monitoring, training site, trainers, and scheduling) should be measured directly. In addition, some quantification of the degree of relevance of the program to teachers' perceived and actual needs should be attempted.

At Level II, the best measures are those of increased teacher competence. If the program is of novel content (as a computer inservice might well be), conventional measurements might have to be supplemented with new ones that reflect the content of the training. Observational measures of actual classroom practice are the preferred instruments.

At Level III, measures of student achievement are appropriate. Because this level is rather far removed from the training, it may be difficult to attribute changes in student behavior directly to actual inservice practices.

At Level IV, we hesitate to suggest methods of measurement. Although instruments can be created to measure school climate and levels of intercommunication among the staff (Joyce, Hersch, & McKibbin, 1983), it is perilous to presume explicit connections between an inservice program and a change in the school environment.

Conclusion

To narrow the scope of the literature on effective inservice, this review concentrates on literature dealing with the actual conduct of inservice.

The five dimensions of inservice (i.e., content, delivery system, organizational content, governance, and evaluation [Gall & Renchler, 1985]) were used to examine the literature. The predominant feature of the literature is its bases in common practice, rather than on actual research. Literature specifically related to implementing changes in educational computing is extremely limited. The literature that exists concentrates on the delivery system aspect of Gall's classification.

Currently, staff development is the major tool for implementing educational change. Reviewing the literature confirmed our intuitive belief that effective inservice is difficult to attain for the following reasons:

1. Change is multidimensional. (We are dealing with change in a school system, and a school system is a very complex entity.)
2. Change is a slow process. (It is the nature of a stable and functioning system to resist change. School systems seem to be exceptionally resistant to change, and change only slowly.)
3. Effective inservice is resource intensive. (In many settings the resources available for inservice education may not be adequate to produce a significant change.)
4. Learning styles of adults are complex. (A typical inservice will involve adults with widely varying interests, characteristics, and backgrounds.)
5. Global characteristics of school systems, many of which are outside the influence of the inservice provider, influence change.
6. Participation of teachers in the process of setting goals for inservice may enhance the learning of the participants, but it is difficult to properly achieve this participation in goal setting.
7. Mechanisms for evaluation of inservice programs are ill-defined and infrequently attempted.

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1.2

THE CI^3 MODEL FOR EFFECTIVE INSERVICE

(Note: This is a slightly modified version of a paper written by Seymour Hanfling, Judi Mathis, and Jim McCauley for presentation at the University of Oregon "Extensions of the Human Mind" conference in August 1986. These three authors were all members of the NSF CI^3 project staff when the paper was written.)

The Computer-Integrated Instruction Inservice (CI^3) project directed by Dr. David Moursund began in September 1985. The purposes of the three-year project: were (a) to develop an inservice model for educating teachers in methods of integrating general computer software tools such as databases, spreadsheets, graphics programs, science tool kits, into their curriculum; and (b) to develop a method for training inservice trainers in the use of that CI^3 model.

During the first year the project team concentrated on developing the inservice model and materials in two areas: elementary schools and secondary school mathematics. The second year of the project continued this teacher inservice development and extended it to include secondary school science. It also developed an inservice to train trainers in the use of the CI^3 model. The third year will refined the materials from the second year, created materials for secondary school social studies, and began dissemination of the results of the project.

The ultimate goal of the CI^3 project is to bring about improvement in the classroom; this is a formidable task. The process of bringing about improvement through innovation in the classroom by staff development has been studied extensively (Berman & McLaughlin, 1978; Dillon-Peterson, 1981; Fullan, 1982). Even though there is no agreement on the "one" best way to do staff development, there is agreement on the need for the support and involvement of the major components of an educational system: the teachers in a school or department, the building administration, the central administration, the school board, and the students' parents. The CI^3 project used this knowledge in formulating an inservice program.

First, we received the support of the central administration of the district within which the workshops took place. Second, we viewed the school (or department in the case of a high school) as the unit of change, not the entire district. We worked with groups of teachers from a building (or department). Finally, an administrator from each building was required to participate along with the teachers. As Wood, Thompson, and Russell (1981) point out:

> For staff development to have a lasting effect, the principal must be committed to the implementation of the inservice goals, participate in the inservice planning and activities, encourage other staff members to participate in training programs, and support and reinforce the implementation of new knowledge, skills, and strategies. (p. 63)

During the first year of the project we were quite successful in getting school administrator participation in the project. During the second and third years we were less successful. There is a substantial body of theory on how to organize and conduct an inservice to be as effective as possible. It usually turns out that there is a substantial difference between the theory and what one is actually able to accomplish. In this case, we were not able to secure school administrative participation at the level we would have liked during the second and third year.

During the first year, the CI^3 project worked with two groups of educators. One consisted of the principals and a number of elementary school teachers from three schools. The second consisted of mathematics teachers from a middle school and a high school and an administrator from each building. There were approximately 17 participants (all volunteers) per group.

Prior to the training, a needs assessment was conducted by interviewing all the participants. We acquired knowledge on a variety of topics, including the participants' current educational and personal computer usage; their access to computers, computer lab(s), and software; their views on educational uses of computers; and the areas in which they desired training.

Originally seven inservice sessions were scheduled. The sessions were conducted after school and usually at the computer lab sites of the participating schools. (Two sessions were conducted on the University of Oregon campus.) The introductory and closing sessions were originally scheduled to be five hours long (with dinner provided), and the five other sessions were to be two hours in length, held every other week. The teachers found the first five-hour session to be too long after teaching all day. We adjusted our schedule and shortened the last session to two and a half hours. As a result of this experience, we redesigned the second and third year inservices to consist of 16 hours of workshops in eight two-hour sessions.

The Inservice Model

> The wise leader knows that the true nature of events
> cannot be captured in words. So why pretend?
> Confusing jargon is one sure sign of a leader who does
> not know how things happen.
>
> *The Tao of Leadership* by John Heider

Inservice Design Principles

The participants in our inservices reflected a wide range of backgrounds and teaching environments. Although this lack of homogeneity is a common difficulty in computer-related inservice education, it led to the development of a significant premise of these workshops.

Clearly, these workshops are *not* inservice *trainings* in the sense of teaching a specific teaching technique, computer management skill or even competence with a specific piece of software, but instead are *educational* workshops. They are meant to expand teacher knowledge and capabilities in the classroom, and they provide an environment for exploring and learning about the applications of computers and software tools in the curriculum.

The issue of training versus education is critical. Computers will be part of education from now on. All teachers will eventually need to deal with computers in schools. Computer inservice for teachers needs to be an appropriate blend preparing them to make some immediate use of computers, but also laying a firm foundation for continued growth and learning in this field. It was our observation that many inservices on computers place too much emphasis on what keys to press and the specific details of particular pieces of software. Many inservices of this sort do not do a good job of developing computer-related foundational knowledge such as general roles of computers in problem solving, changes in education needed to prepare students for life in an Information Age society, etc.

The following design principles were used to create the balanced environment we deemed to be appropriate:

1. Each session should offer participants at least one idea that can be used immediately or in the short term future in their classrooms. This idea might be an activity, a piece of software, a teaching style, or a management aid. The sessions are rich learning environments in which participants discover and experience many ideas and applications of computer-related activities and software tools. These environments provide many opportunities for participants to find ideas that are appropriate and relevant to their

instructional situations. The process of discovery also helps build ownership and increases the likelihood of classroom implementation.

2. Software should always be introduced in an instructional context. Rather than training participants in the details of a piece of software, the tool is introduced with classroom examples. Activities are designed so the participants can be successful even if they have only partial knowledge of the software. This allows teachers to see that they need not understand all of the nuances of a program before they use it in the classroom. There are two reasons for this approach: First, it helps teachers explore and gain an understanding of the instructional uses of a specific software tool. Second, it provides a model for teachers to experience an activity and begin to adapt the activity to their own classrooms.

3. Participants should experience activities on two levels. First, as "students" in an inservice, are the activities meeting the objectives? What is being learned? What is being experienced? Is it enjoyable? Second, they are asked to analyze the activities and the inservice itself: What activities have been chosen? Why have those activities been selected and not others? How can those activities be adapted to their classroom?

   Reflection and discussion of these questions occurs at different times. The participants are briefly reminded to note and reflect on the first questions while they are doing an activity. These questions are then repeated during the closure discussion for an activity. The second set of questions is also discussed during closure for an activity and at the closure for the entire session.

4. The participants should work in groups. There are four reasons for this. First, Cox and Berger (1985) have shown that working in groups on the computer is more effective in solving problems than working individually. Second, the participants become accustomed to discussing computer-related curriculum matters with each another. This helps build a school level and district-wide resource base, and it builds a spirit of mutual support among the inservice participants. Third, it allows the trainers to work with more of the participants. Finally, it allows the trainers to eavesdrop on participants' conversations and gain relevant information for conducting discussions and directing the remainder of the session.

   In recent years the effectiveness of cooperative learning has become clear. Many people fear that computers will be used to isolate students and work against against the cooperative learning environment. But this need not be the case. Many computer activities can be done in a cooperative learning environment, and research supports this approach as being good.

5. Each session should be structured to allow participants to discover methods and models of instruction. The participants demonstrate or gain an understanding of these methods during the debriefing of each activity or at the session closure. This approach differs from many prevailing inservice formats by avoiding an explicit statement of inservice objectives at the outset of each session. Our goal is to avoid creating a specific mind-set in participants that may deter them from making their own original observations or restrict them from making additional observations. It also allows them to experience the activities as their students might, thus providing valuable insights that can be gained in no other way.

   Imagine, for a moment, a scale which is labeled "Pure Discovery" on one and "Pure Directed Instruction" on the other end. Most of the instruction in our schools is conducted using a style that is much closer to the Pure Directed Instruction end than to the pure Discovery end. But it is essential that both teachers and students learn to use computers in a discovery-based mode, so that they feel comfortable in working with new software applications and learning on their own. Thus, in designing the inservices, we made a decision to place major emphasis on discovery-based learning about computers. We reasoned that if teachers learned about computers in this type of mode, they would then use it with their students as they introduce computers into their classrooms.

This method requires the development of mutual trust. Through the activities the participants discover, learn, and gain insights across many pedagogical domains. During the debriefings the trainers can aid the participants in understanding and adapting their insights. This discovery and debriefing-oriented model is stimulating, interesting, and successful.

A key aspect of discovery-based learning is the debriefing periods at the end of discovery sessions. The course instructor (the facilitator) must have a clear picture of the key elements that are to be discovered. (Of course, it usually happens that many additional important elements are discovered.) The debriefing sessions allow participants to bring up and discuss the ideas that they have been working on and discovering. The facilitator must ensure that all key elements are brought up and that they receive appropriate emphasis.

6. The sessions should be *enjoyable!* There has been substantial research on the relationship between attitude and learning. We know that if participants are enjoying the learning experience, they will learn more and better.

Material Selection and Development of Activities

The main reasons that computers are so heavily used in business, government, and industry is that they are a powerful aid to problem solving and productivity. Computers can solve or help to solve a wide range of problems. The focus of this CI^3 project is to improve student problem solving by integrating of software tools (e.g.,graphics, databases, spreadsheets, science kits, etc.) into the curriculum. Thus, the theme of problem solving is interwoven throughout the design of the inservices. Inservice participants can explore and experience the use of these tools by solving problems presented in the inservices. These experiences also encourage participants to discover new ways to pose problems and even new types of problems to be solved.

Problem posing and problem solving are higher-order skills, essentially corresponding to the Analysis, Systhesis, Evaluation end of Bloom's taxonomy of cognitive skills. There is a strong and growing movement in our school system to place increased emphasis on such higher-order skills. Computers are a vehicle that can help in this endeavor.

Problem posing and problem solving are interdisciplinary skills. They are not, as many teachers think, just mathematics. All teachers should have their students pose and solve problems. All teachers should teach problem posing and problem solving as part of their overall curriculum.

Due to the wide range of backgrounds and experiences of the participants, as well as gender differences, careful selection of materials and activities is important. However, selection of software is also limited by practical constraints. Our selections are based upon availability, quality, utility in the particular inservice situation, appropriateness to the grade and concept level, and effective cost. The last item refers to software that is under district license, in the public domain or allows multiple loading. (Some software companies give special permission for multiple loading to educators conducting teacher training.)

After the design of activities and selection of software, performance aids and learning aids (worksheets) are developed. *Performance aids* contain the basic information necessary to use a piece of software; keystroke commands, data retrieval and printer commands, for example. Many participants find that they can use unfamiliar software with a minimum of instruction if supplied with an appropriate performance aid. Participants can also learn to use some software through on-line tutorials.

Learning aids contain problems that increase in complexity and software knowledge; therefore, they may contain software comments where appropriate (e.g., how to print a graph). These worksheets range from very specific instructional sequences to open-ended explorations.

Along with performance and learning aids, sample lesson plans are provided, which can be adapted, extended, and used as models. They are important in assisting participants to transfer inservice concepts to their classrooms, and reduce the amount of effort required to develop and transfer new activities to the classroom.

Organization and Development of an Inservice Script

In organizing the sessions we tried various inservice methods and activity sequences. The ones we found successful were those that embodied our assumption that instruction is a dynamic process by nature. Decisions are made continually through the interactions of the trainers, the participants, and the content being presented. Thus, the framework of these sessions must be flexible. The same session presented with different groups of participants might begin in the same way, but then, based upon their responses and needs, proceed along different paths. Many times the participants are offered a choice of options or they are allowed to offer their own suggestions on the next step in the inservice. This dynamic process is difficult to capture in words. In the following discussion it is important for the reader to keep in mind that these inservices embody a process that is designed to be flexible.

Sequencing of Activities. The sequencing of all activities enhances concept attainment and assists in the transfer of these concepts to the classroom. The sequencing of activities begins with the most concrete activities and progresses to the more abstract.

The typical sequence for an activity is:

1. *Explore*. Allow participants time to "play," so that they may develop an intuitive understanding of the software or activity. Participants make use of a Performance Aid.

2. *Experience*. Work on the software or activities in an instructional format that models classroom presentations. Participants make use of a Learning Aid.

3. *Discuss*. Debrief the activity, paying particular attention to participants' feelings, experiences, attitudes, and ideas for instructional applications. The facilitator makes sure that key ideas that the lesson was designed to cover were indeed covered and get discussed during the debriefing. But keep in mind that the debriefing is to be conducted in a discovery based mode. The facilitator should avoid, as much as possible, switching into a directed instruction mode during the debriefing.

4. *Closure*. The facilitator gives a brief summary statement. Relate this activity to the objectives of the session or previous sessions. Integrate previous participant comments as frequently as possible during closure.

Sequencing within a session. We begin each session with a hands-on activity or an off-machine problem solving activity that is approximately 5-15 minutes long. (We strongly encouraged participants to work in pairs on the computers. Sometimes a person would decide to work alone, and sometimes three people would work together.) This instant involvement is very useful in setting the tone for the day's session. It allows participants to begin participating as soon as they arrive, and it handles the situation of some participants showing up a little late. The debriefing of this opening activity provides an opportunity to discuss the focus and general goals of the session. (A general goal might be to explore uses of computers to store and retrieve information as an aid to solving problem.)

The next 30-40 minutes is spent exploring activities on the computer with participants working in groups, generally in pairs. This exploratory period might be directed by the trainer or through performance and learning aids, with a focus on the specific objectives of the activity. Participants may become involved in trying to "solve the puzzle" or "beat the computer," and it is sometimes necessary for the trainers to draw the participants' attention to the instructional aspects of the activities. The participants may finish an activity at a later time and at their own pace.

The debriefing of all activities is extremely important. As described above, explanation and debriefing of all activities follows rather than precedes the activities. This allows participants to experience an activity in a situation without a trainer-induced "mindset" and places them in a similar position to that of their students. Encouraging participants to generate ideas contributes to the transfer of ideas from the inservice to their teaching situations. It is more likely that teachers will try new classroom practices if they have experienced these new practices in the workshops and then analyzed and reflected upon them.

The remainder of the session is spent intermixing off-computer and computer-based activities. The participants enjoy the integration of off-computer activities into the sessions. The concrete nature of these activities provides a bridge to the abstract nature of the computer.

Final closure for an entire session provides a transition from the inservice setting to the classroom. Our experience indicates that the integration of software tool activities into classes seems to take place if the integration (a) allows students to learn better, faster or in more exciting ways; (b) allows students to work with more important concepts than they are now learning; and (c) is not appreciably more difficult for the teacher than present instructional practice. Discussions during final closure are useful in generating ideas that illustrate these points.

Once the above ideas have been used in planning a session or series of sessions, it is important to review the entire set of activities. Are the transitions smooth? Are the activities building upon each other? Are the original objectives still being met? (The last question can sometimes be overlooked as "exciting" activities and software hide or even change the original objectives.) Finally, is this still a inservice that is interesting and enjoyable to lead and experience?

Inservice techniques. Like any teachers, we use a variety of techniques during the sessions. The following are those we find useful and consider the most important:

1. Model classroom activities and appropriate teacher behaviors. We generally teach the way we have been taught. The importance of modeling appropriate teacher behaviors cannot be overstated in helping participants to integrate new ideas into their classes. Merely "discussing" how activities can be done in the classroom is insufficient; they must be *experienced* in order to be understood. (Note that there is some research that suggests that elementary school teachers like to be in inservices that model appropriate behavior, and that secondary school teachers are less supportive of such an approach to inservice education.)

2. Identify and utilize participants with knowledge of the inservice contents. (No matter how carefully one states the prerequisites and describes the intent of an inservice, the participants will have widely varying backgrounds. Frequently there will be one or more participants who are quite qualified to be facilitating the inservice.) Forming groups where at least one of the participants has experience with a piece of software can help make workshops go more smoothly. Establish peer support by publicly validating participants' knowledge and encouraging peers to consult each other for answers. Remind participants that they are experienced educators who bring a multitude of skills to the inservices. (An analogous situation for teachers is using students in their class who are experienced with software to act as helpers or teachers to other students.)

3. In the debriefings and discussions, encourage participants to analyze the activities from two perspectives: that of a student (their experiences while using the software) and that of a teacher.

4. Obtain feedback from the participants at each step of the inservice. Be responsive to their needs and, when appropriate, modify the inservice plan. When necessary, help the participants reevaluate their expectations in order to gain the most from the inservice. For example, because a wide range of teacher backgrounds is present at a inservice, a specific piece of software may not fit everyone's teaching assignment. Shift the focus of those teachers toward examining the software for its strengths and weaknesses: Is it easy to use? Is the feedback appropriate? Does it allow for exploration?

5. Do not be disturbed if the time schedule that you have set occasionally requires you to interrupt participants in the middle of an activity. Research suggests that this can actually contribute significantly to learning. The interruption provides a time for participants to reflect upon their experiences during an activity.

6. Use open-ended questions that encourage teachers to reflect on the session's activities. Convergent questions can cover the content and analysis, as well as pacing and sequencing. Divergent discussions can cover transfer of the activities to the classroom and possible impact on the curriculum and individual classes. These types of questions are important and cannot be hurried. A time for reflection and analysis helps participants gain the ownership necessary to integrate new ideas into their own educational setting.

7. When the trainer does not have an answer to a question, the best response is "I don't know, let's see what all of together know about this question." There may be participants that can provide information, just as the teachers may have students in their class who can help them with a piece of software or activity.

Reference Materials, Handouts, and Log Sheets

Each participant receives a set of materials at the first session, including relevant journal articles, software reference lists, classroom ideas and public domain software. Refer participants to elements of this collection whenever related activities or discussions take place.

The participants are asked to keep a log of their computer-related activities, including: classroom lessons, work with individual students, personal use, readings and discussions with colleagues. This log form also can be used to ask trainers for information or help. The trainers respond to questions, suggest software the participants might wish to preview, and return the logs. These forms are an important feedback mechanism. It is an efficient way for participants to communicate with the trainers to have a record of their computer-related activities.

School Visits

Based on the experience from this project, classroom visits should be included as part of the inservice program. This can be done in a variety of ways: A trainer may model a lesson in a participant's classroom; both the participant and trainer may teach a class together; or the trainer may observe the participant teaching a lesson. Many teachers feel that this type of interaction is helpful.

Closing Comments

We have spent many hundreds of hours working on the CI^3 project. It has been difficult to summarize what we have learned, primarily because, as stated earlier, education is a dynamic process. The only way to learn a process is to do it. What we have presented here is a framework that has been effective. However, this is not the end of the development of an effective inservice model. Both formative and summative evaluations have taken place or are in progress; some of the results are given in Part 5 of this Notebook. As you practice using the inservice materials in this Notebook, and as you continue to practice and study the field of inservice education, you will get to be a better facilitator of inservices. One of the joys and frustrations of education is that it is constantly evolving and that educators need to be lifelong learners.

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BACKGROUND INFORMATION

2.1

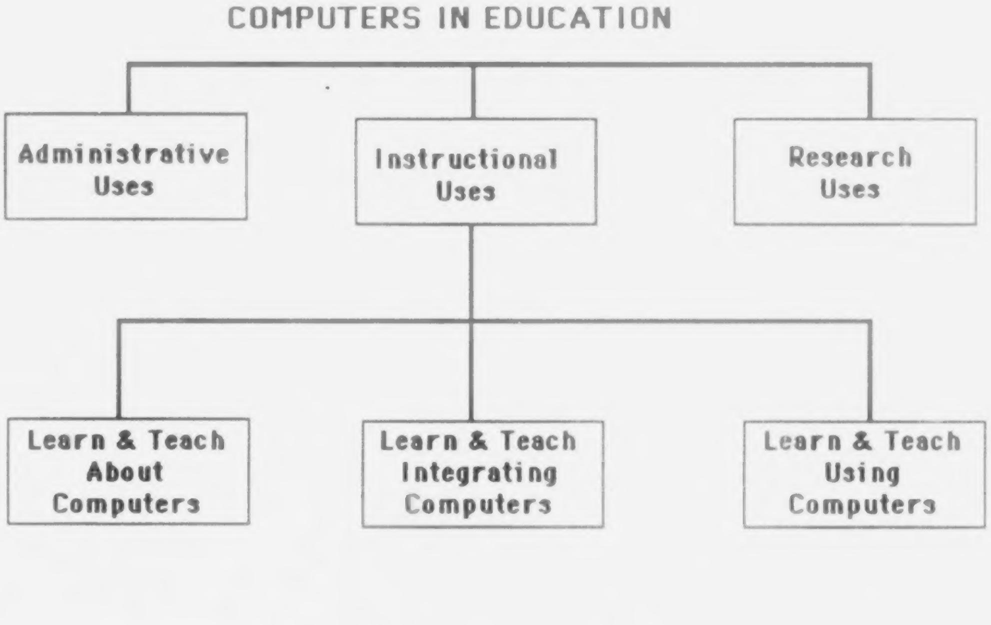
OVERVIEW OF COMPUTERS IN EDUCATION

Computers are important and widely used in our society because they are cost effective aids to problem solving in business, government, industry, education, and other areas. The primary focus of this Notebook is on the use of computers as an aid to problem solving.

This chapter of the Notebook provides an overview of computers in education, with primary emphasis on Computer-Integrated Instruction (CII). The underlying assumption is that we want to increase students' ability to make use of the computer as a tool in problem solving throughout the curriculum. This chapter might be given to inservice participants as general background reading.

Computers in Education

The diagram below presents a structure of the overall field of computers in education. As indicated in the diagram, the field of can be divided into three main parts. Although each part will be discussed briefly, the main focus is on *instructional uses* of computers. As the diagram illustrates, instructional uses of computers also may be divided into three parts. After briefly discussing each part, we will focus on *learning & teaching integrating computers*. We call this part Computer-Integrated Instruction (CII).


COMPUTERS IN EDUCATION
Administrative Uses
Instructional Uses
Research Uses
Learn & Teach About Computers
Learn & Teach Integrating Computers
Learn & Teach Using Computers

Administrative Uses

Many aspects of running a school system are similar to running a business. A school system has income and expenses. It has facilities and inventories. It has employees who must be paid and employee records that must be maintained. And, of course, a school system has students who must be taught. Detailed records must be kept on student performance, progress, and attendance.

Computers can be cost effective aids to accomplishing all of the administrative-oriented tasks listed above. Thus, it is not surprising that computers are extensively used for administrative purposes in most school districts in this country. In some school districts this use goes back more than 25 years. Overall, the administrative use of computers in schools is growing steadily.

At the current time there are two major approaches to administrative use of computers in schools. One approach is based on centralization. A large, centrally located computer system is used to serve a number of schools, as well as central school district office needs. There may be terminals to individual schools. Thus, some input and output operations may occur at the school sites. Other operations especially those involving large amounts of input and output, occur at the central facility.

An alternate approach that has gained considerable support in recent years is to place administratively oriented microcomputer systems into individual schools. Initially these were self-contained microcomputers, but there is a growing tendency to network them. It has become clear that microcomputers can make a substantial contribution to the functioning of a school office.

It seems evident that there will be a continuing need for a central, powerful computer system in most school districts. Also, it seems evident that on-site microcomputers will become increasingly popular. What is not so clear is how and to what extent the central facility and the on-site microcomputers should be networked together, nor is it always evident which computer applications are best accomplished at the school site and which are best accomplished at the central facility.

The design and implementation of a school district administrative computer system is a task for computer professionals. It takes years of computer education and experience to become well qualified at dealing with this type of task. It is important to realize the level of training and experience needed, since few computer-using teachers have this type of training and experience. In most school districts the instructional computing coordinator does not attempt to also be the administrative computing coordinator, since these positions require such different types of training and experience.

Research Uses

Educational research has benefited immensely from computers. Many educational research projects involve collecting large amounts of data and subjecting that data to careful statistical analysis. If a research project has a control group and a treatment group, students in the two groups may be tested extensively during various phases of the experiment, resulting in a substantial collection of data. Large libraries of statistical programs have been available for more than 25 years. Now such program libraries are even available on microcomputers. Thus, it is relatively easy for a researcher who is knowledgeable in the use of statistical packages to carry out a number of statistical analyses on the data collected.

Computers are making it easier to conduct longitudinal studies. Detailed records can be kept over a period of years. These records can then be analyzed, looking for patterns or trends that might not be evident under casual scrutiny. This type of research is common in medicine, and some of it has been done in education.

Computer-Assisted Learning (which will be discussed later in this chapter) provides an exciting vehicle for research. As students interact with computers while studying a particular subject, the computers can collect and maintain detailed records. These records can be analyzed to help determine which aspects of the instructional program seem to be most effective, and which need modification. Such formative evaluation can provide the foundation to improve instructional materials.

If a school district is large enough to have an evaluator on its staff, the evaluator is apt to be quite knowledgeable in research uses of computers. It is important to understand that administrative, research, and instructional uses of computers are relatively distinct fields of study. A person may be an expert in administrative uses of computers, yet have little knowledge of the statistical packages and statistical techniques of a researcher. Similarly, a person may be an expert in instructional uses of computers but have little knowledge of the hardware and software needed in an administratively oriented computer system.

Instructional Uses

Our diagram of computers in education divides instructional uses into three categories. The categories overlap to a certain extent, but it is helpful to look at each individually. The first one we will examine is **Learn & Teach About Computers.** Learn & Teach About Computers focuses on the discipline of computer science. (A very broad definition of computer science is used, which includes information science, data processing, computer engineering, etc.) This is a well established discipline; many colleges and universities have had bachelor's degrees and/or graduate degrees in these areas for more than 20 years. There are hundreds of journals and magazines that publish the rapidly growing body of computer-related research.

A few high schools began to experiment with teaching computer programming in the late 1950s. This early use of computers in schools provided solid evidence that high school students could learn to program in assembly language or Fortran. However, computers were quite expensive and not particularly accessible for use in high schools.

The development of timeshared computer systems and the language BASIC in the early 1960s opened up the possibility of large number of students learning to write computer programs. As timeshared computers decreased in price, more and more schools began to offer a course in BASIC programming.

By the early 1970s it was becoming clear that computers were beginning to transform our society. The Industrial Age had ended, and the Information Age had begun. Many educators argued that all students should become "computer literate," and that this could be best accomplished through specific computer-oriented coursework. Often the courses were in introductory BASIC programming. The trend toward students taking computer programming-oriented courses increased rapidly as microcomputers became available to schools beginning in the late 1970s.

Now a counter trend has emerged as people realize that it is not necessary to learn to write computer programs in order to make effective use of a computer. Many introductory courses have reduced their emphasis on computer programming and increased their emphasis on using applications software that use the computer as a tool. Computer literacy courses have been developed that contain little or no computer programming. Secondary school enrollments in computer programming and computer science courses have dropped markedly.

The rapid growth of applications-oriented computer literacy courses have caused a number of educational leaders to ask why such instruction must be limited to a specific course. Would it be better for students if computer applications were taught throughout the curriculum? The idea is that students should make use of the computer as a tool in all courses where appropriate. That is exactly what Computer-Integrated Instruction is about, and it is the main focus of this Notebook. CII will be discussed further later in this chapter.

The teaching of computer programming and computer science courses at the precollege level is slowly beginning to mature. A Pascal-based Advanced Placement course has been developed and is now widely taught. This has tended to lend structure to the high school computer science curriculum. However, it is evident that this type of course appeals to only a small percentage of high school students. Enrollment in introductory programming courses that use BASIC, Logo, or other non-Pascal-like languages remains high. On a nationwide basis, however, such enrollment peaked several years ago and has declined substantially since then.

Logo has developed a wide following, especially at the elementary school level. Some teachers view the learning of Logo as an end in itself. However, most Logo-oriented teachers recognize the potentials of Logo as a vehicle for illustrating and teaching various problem-solving strategies. The turtle geometry part of Logo also can be used effectively to help students learn a number of important geometric ideas. The *Logo Exchange*, a nine times per year periodical published by the

International Society for Technology in Education, is specifically designed for educators interested in using Logo in schools.

Learn & Teach Using Computers. A computer may be used as an instructional delivery device. This type of computer use is often called computer-assisted instruction, computer-based instruction, or computer-assisted learning. In this Notebook it is referred to as Computer-Assisted Learning (CAL).

CAL is sometimes divided into categories such as drill and practice, tutorials, and simulations or microworlds. Most CAL systems include a recordkeeping system, and some include an extensive diagnostic testing and management system. Thus, computer managed instruction is sometimes considered to be a part of CAL.

Initially, most CAL material was designed to supplement conventional classroom instruction. For example, elementary school students might use drill and practice mathematics materials for 10 minutes a day. But as computer hardware costs have declined and more CAL materials have been developed, there is some trend toward implementing substantial units of study and/or entire courses. Declining hardware costs make such CAL use economically feasible. For example, suppose that a small high school has only a half dozen students per year that want to take particular courses such as physics, chemistry, or advanced mathematics. It may be much more cost effective to make such courses available through CAL than through a conventional, teacher taught, mode.

CAL has been heavily researched over the past 30 years. The evidence strongly supports the educational value of using CAL in a wide variety of settings. The success of CAL may be explained by three factors. First, students using CAL on the average spend more time on task. Because learning correlates well with time on task, students on the average learn faster using CAL. Second, CAL materials allow students to work at their own levels and at their own rates. This individualization is a considerable aid to some students. Third, CAL materials can incorporate good practices of instructional and learning theory. Formative evaluation can provide a basis for improving CAL materials under development. Through this approach, the quality of commercially available CAL materials is gradually being improved.

Learn & Teach Integrating Computers. The third category of instructional use of computers is Computer-Integrated Instruction (CII). CII focuses on the computer as a productivity tool, an aid to problem solving. One orientation focuses on general purpose or generic application packages such as database, graphics, spreadsheet, word processor, and telecommunications. Each of these application packages is widely used in business, industry, and government. In education, each can be used at a variety of grade levels and in a variety of courses.

A second orientation focuses on the development of applications software for a specific discipline. For example, there is now a substantial amount of software that can help a person compose music. Such software makes possible the teaching of musical composition to elementary school students. There is a substantial amount of Computer-Assisted Design (CAD) and other graphics artists software. Such software tools are often now centrally used in high school courses that used to focus on drafting or engineering drawing.

It has long been recognized that precollege students could learn to use computers as an aid to problem solving. The initial approach, now dating back more than 25 years, was to have students learn to write computer programs to solve specific categories of problems. For example, it was suggested that if a math student could write a computer program to solve quadratic equations, this indicated real understanding of that mathematical topic. Over the years there have been a number of research studies on whether this is indeed correct. While the results have been mixed, it seems clear that having students write computer programs to solve math problems is not a magical solution to the problems of mathematics education that our schools face.

Initially, such an approach to CII made little progress because both the programming languages and the computer hardware were not suited to the needs of most precollege students. But the advent of timeshared computing and BASIC have helped to change that. And then, beginning in the late 1970s, microcomputers, with built-in BASIC, made it feasible for millions of students to learn to write simple programs to solve specific categories of problems.

It takes considerable time, as well as a specific type of talent, however, to become a competent computer programmer. It was soon recognized that the time was being taken away from the study of conventional subject matter. The movement toward integrating computer programming into various high school courses has long since peaked and has been replaced by a trend toward using applications packages. This new trend has accelerated as better applications packages have become available for microcomputers used in schools. An increasing percentage of this software is specifically designed for use in education.

Word processing can be used to illustrate both the general idea of CII and some inherent associated difficulties. Word processing is a generic computer application tool in the sense that it is applicable across the entire curriculum at all grade levels. Clearly, a word processor is a cost effective productivity tool for secretaries and for many people who do a lot of writing. Moreover, word processors make it easier to do process writing (prewrite, compose, conference, revise, and publish). For these reasons, many schools have decided to have all their students learn to do process writing in a word processing environment.

But it takes quite a bit of instruction to learn to make effective use of a word processor. To learn proper keyboarding techniques and to keyboard faster than one can handwrite takes a typical fourth grade student about 30 minutes a day for eight weeks or more. To learn to compose at a keyboard and make effective use of a word processor takes additional instruction and practice.

There are several additional difficulties. First, teachers have to learn to provide the initial instruction and to work with students who do process writing in a word processing environment. Even if the initial instruction is provided by a specialist rather than the regular classroom teacher, the classroom teacher must work with students after the initial instruction. All of the students' subsequent teachers face the same problem. This suggests that large numbers of teachers will need to learn to work with the idea of process writing in a word processing environment.

Second, there is the matter of access to appropriate computer systems. Once a student becomes adept at this mode of writing, the student will want to continue its regular use. This can easily require providing each student with 30 minutes of computer time per day. It also raises the issue of needing to provide computer access for students to use at home, after school, and on weekends.

Third, there is the problem of testing—especially standardized testing. Suppose a student has had several years' experience in using a word processor to do process writing. The student has learned to approach writing projects using this productivity tool. There is a good chance the student can write better and faster using a word processor than using pencil and paper. An appropriate assessment of this student's writing skills requires giving the student access to a computer during the test.

Fourth, once one has a word processor, it is quite helpful to have a spell checker, a grammar/style checker, and an outliner. Such aids to writing may have a significant impact on the nature of the writing curriculum. They may require changes in textbooks, lesson plans, and the way class time is structured. And once again the issue of testing arises. Should a student be allowed to use spelling and grammar checkers when doing writing for an essay test?

These four types of difficulty occur for all CII applications. The problem of teacher training is addressed specifically by the materials in this notebook. The problem of access to appropriate hardware and software will be with us for many years to come. It can be overcome through appropriate allocations of money. The testing problem is being addressed by a number of agencies involved in widespread assessment. For example, some states and provinces now allow use of calculators on certain tests. However, it seems clear that this will be a long term problem. Textbook companies are slowly beginning to address the issue of integrating the computer as a tool into the books they publish. School districts and individual teachers interested in making more rapid progress are developing their own curriculum materials.

The Potential of CII

Many work environments now provide a computer or computer terminal for every employee. It is clear that this will become more and more common, since computers are such useful aids to solving certain types of problems and increasing human productivity. Thus, it seems appropriate to assume that increasing numbers of today's students will use computers when they go to work.

Research on transfer of learning strongly supports the position that instruction and training should closely parallel the final desired behaviors. Thus, if we need workers who are adept at using computers to aid in solving problems, we should integrate computer use as students develop their basic problem-solving skills and strategies. For these and other reasons, it seems clear that CII will grow rapidly for many years to come.

As CII increases, both teachers and students will begin to question the content of many of their courses. If a computer can solve or help solve a particular type of problem, what should students learn about the problem? Is it necessary and appropriate to learn to solve each type of problem using only conventional aids such as books, and pencil and paper? Or, should schools focus more on underlying concepts and help students gain an overall understanding of problems that computers can solve?

In some cases an answer will be forced on schools. For example, libraries are being computerized. Card catalogues are being replaced by computerized information retrieval systems. Important publications are available only in computer databases. Since learning to access information is an essential component of education, students will have to learn to use databases and computerized information retrieval systems.

In other cases schools will have wide options. For example, consider the impact that handheld calculators have had on the upper elementary school and middle school mathematics curriculum. While the potential for calculator-integrated instruction is large, the actual impact on the curriculum has been minimal. This is true in spite of many years of strong support from the National Council of Teachers of Mathematics for integration of calculators into the curriculum. In April 1986, the NCTM issued still another strong statement recommending calculator use at all grade levels. A few states and provinces are now beginning to allow use of calculators in certain testing situations. We may be seeing the beginnings of a trend toward allowing calculators (and, eventually, computers) in standardized testing situations. During the academic year 1987-88, for example, the Chicago public schools purchased approximately a hundred thousand calculators for use by their students.

Much of the short term potential for CII depends on how well our educational system addresses the issue of inservice education. All current teachers can learn to make effective use of CII. Given appropriate inservice educational opportunities, many will do so.

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2.2
ROLES OF COMPUTERS IN PROBLEM SOLVING

Each academic discipline focuses on certain types of problems. Each discipline has vocabulary and notation, methodology, and tools to aid in describing and solving its problems. Problem solving is a unifying theme throughout all of education. In this chapter we use the term problem solving in a very general sense, so that ideas such as higher order skills and thinking skills are also included.

Undoubtedly the single most important idea in problem solving is that of building on the previous experiences of oneself and others. For example, consider the importance of language in problem solving. The language(s) you speak and read have been developing over many years, beginning long before you were born. You learned to speak and read many years ago, so that now when you speak or read you are using learning work that you did long ago as well as building on new meanings words have taken on for you.

Paper and pencil provides another type of example of building on the previous work of oneself and others. It is evident that paper and pencil are useful aids to problem solving in every discipline. Paper and pencils artifacts developed and produced by people. When you use these artifacts, you are building on the work of the inventors, producers, and distributors of these artifacts. Paper and pencils are tools that you spent many hours learning to use when you were young. You now use them readily and with little conscious thought of your earlier learning efforts.

The Computer Tool

Now we have a new, general purpose aid to problem solving. (Actually, the electronic digital computer was invented in the 1940s, so it really isn't very "new" anymore. Commercial mass production of computers began in 1951 with the introduction of the UNIVAC I. Most people who talk about the computer being a new tool are people who have been introduced to computers relatively recently. The computer is new to them, so they assume it is new to others.) The advent of the microcomputer beginning in the mid-1970s has made computers readily available to very large numbers of students and workers. However, it is only recently that enough computers have been made available to precollege students to begin making an impact on their education. In that sense, computers are still a new tool in education.

One of the most important ideas in problem solving is that the aids available for solving a problem shape the thinking processes used. You have grown up with books and pencil and paper. When you were a young student, you received many years of instruction in their use. Now, when working on a problem, you automatically consider possible uses of these aids.

For example, suppose that you needed to prepare lesson plans for a course. Perhaps you would first do some brainstorming, writing notes to yourself on the major ideas to be covered, sources of information, time lines, and so forth. Next, you might go to your files and pull out materials you have collected and/or used in the past. Then you might begin to organize, writing new materials and adding to old materials. Perhaps a trip to your bookshelf or the library might be necessary. Finally, you might put it all together in a notebook or in file folders.

This description represents a problem-solving process. It involves careful thinking, drawing on one's knowledge of students, one's own teaching skills, the teaching/learning process, school schedules, etc. It involves creating new materials and reorganizing old materials. It involves information retrieval, organization, processing, and storage. In this problem-solving process you automatically and with little conscious thought make use of reading and writing. The reading/writing tools, which are actually essential to solving the problem, are essentially transparent in the problem solving process. That is, you don't even think about them. Eventually it will be this way with computers, and that is a major goal for computers in education.

A computer can be a useful aid in accomplishing much of the work in solving the lesson planning problem discussed above. However, relatively few people have worked with computers long enough for computer use to be second nature. Indeed, it could well be that most adults today will never achieve this level of comfort or ease in using computers. But students who have the ability to learn reading and writing can also learn how to use the computer as a problem solving tool. This can be done through computer-integrated instruction which focuses heavily on the computer as an aid to problem solving.

Because computers are still rather scarce in elementary schools, the idea that students may grow up accustomed to the idea of using the computer as a tool may seem rather "far out" to you. But on a national scale we are now in a period of very rapid growth in availability of computers in schools. The value of learning to use a computer with a word processor, spelling checker, and grammar checker is now widely accepted by educational leaders. Many school districts have made the decision that all their students should have such an educational opportunity. Often these school districts are also teaching their students to make use of databases and computer graphics. Eventually these types of problem solving tools will be a routine part of the elementary school environment as well.

A Definition of a Formal Problem

Every person encounters and copes with a large number of problems every day. Many of these problems are routine and solving them becomes almost automatic. But think for a moment about the variety of problems you deal with in a typical day on the job. For example, as a classroom teacher, you routinely solve problems such as deciding what materials to teach, how to present them to students, how to measure student performance, and how to work with students who are not performing up to your expectations. You attend staff meetings and work on problems faced by the whole school. You handle your personal budget, solving problems on how these funds should be used. It is easy to extend the list, and you should find little difficulty in building your own list. This exercise should convince you that you are an accomplished problem solver and know a great deal about problem solving.

Problem solving has been carefully studied by many great thinkers. There are a number of books that define the concept we call *problem* and explore a variety of problem-solving techniques. (see the references listed at the end of this chapter). We will use the following four components as a definition of problem:

1. **Givens**. There is a given initial situation. This is a description of what things are known or how things are at the beginning.

2. **Goal.** There is a desired final situation (or more than one). This is a description of how one wants things to be; it is a description of the desired outcome.

3. **Guidelines.** This is a listing or description of the general types of steps, operations, or activities that may be used in moving from the Givens to the Goal. Guidelines are the resources and facilities—that is, the powers of the problem solver. (The Guidelines *do not* tell one how to solve the problem.)

4. **Ownership.** In order for something to be a problem for you, you must accept some ownership. You must be interested in solving the problem or agree to work on the problem.

The choice of vocabulary (Givens, Goal, Guidelines) is for the mnemonic value of the three G's. Other writers may use different terms. When we say that a problem is *well defined*, we mean that the three G's are clearly and carefully specified. A well-defined problem can be worked on by people throughout the world over a period of time. Progress toward solving the problem can be shared, and cumulative progress is possible. This idea of sharing progress toward solving a problem or category of problems is absolutely fundamental to the human race making intellectual progress.

We frequently encounter problem-like situations that have some, but not all, of the four defining characteristics of a formal problem. We will call these *problem situations*. Often the most important step in solving a so-called "problem" is to recognize that it is actually a problem situation and then do the work necessary to obtain a carefully defined problem. This requires careful thinking, drawing on whatever knowledge one has that might pertain to the problem situation. Often a group of people will have a brainstorming session to get relevant ideas. See especially the works by Torrance. His research and development group has produced instructional material designed to help students gain improved problem-solving skills. See also de Bono (1971, 1973).

Each of the four components may require further explanation in order to become clear to you. We begin with the last one: Ownership. Some experts on problem solving exclude this component, while others give it considerable weight. If coping with a particular situation is essential to your survival, you are apt to have considerable ownership of this situation. But if the situation is a hypothetical (school book) exercise of little intrinsic interest, you may have little or no ownership. Ownership is a mental state, so it can quickly change.

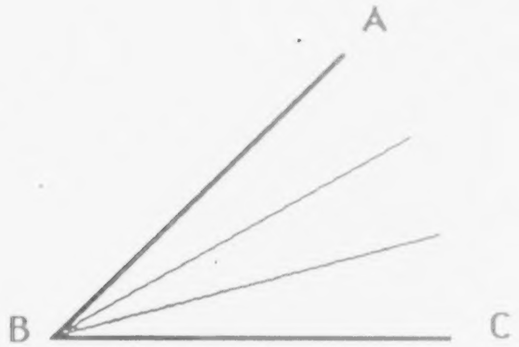
The issue of ownership is particularly perplexing to educators. They recognize that ownership—that is, a deep interest and involvement with a situation—often contributes to deep and lasting learning and intellectual growth. Thus, teachers often expend considerable effort creating situations in which their students will feel ownership.

Some alternatives to ownership are apathy and/or coercion. Keep in mind that problem solving is a higher order mental activity. Most people do not perform higher order mental activities well under coercion or while in a "I couldn't care less" mood.

As an aside, you may know some students who have spent literally dozens or even hundreds of hours working on a particular computer program or mastering a computer system. You may have said to yourself, "If only I could get all of my students that deeply involved." It is clear that such ownership of a computer-related problem has changed the lives of a number of very bright and talented students.

Many people are puzzled at first, by the Guidelines component of the definition of problem. Suppose that you were giving your students a spelling test. From the student viewpoint, the task of correctly spelling a word is a problem to be solved. The student would be successful if allowed to use crib notes or a dictionary. What makes the problem a challenge is that these aids, and other aids such as the use of a neighboring student's paper, are not allowed. The Guidelines specify that students are to do their own work, without the use of crib notes or a dictionary.

For the mathematically oriented reader, another excellent example is provided by the problem situation of trisecting an arbitrary angle. In the figure below, angle ABC is an arbitrary angle (i.e., it is of unspecified size). The goal is to do a geometric construction that divides angle ABC into three equal angles.



Given angle ABC

Sometimes the Guidelines specify that one is only allowed to use a straight edge, compass, and pencil. In that case it can be proven mathematically that the problem cannot be solved. In other cases one is allowed to use a protractor in addition to the other implements. Then the problem is easily solved by measuring the angle, dividing the number of degrees by three, and constructing new angles of the resulting number of degrees. Note that in the latter case the compass is not used, even though it is available. Solving real world problems is sometimes difficult because many resources are available, and often it is not clear which ones to use to solve a particular problem.

For a third example, consider this problem: Teachers in a particular school seem to be using substantial amounts of pirated software. You can investigate the problem situation to clarify the given situation (that pirated software is being used by teachers). You can set a goal, such as reducing the use of pirated software by two-thirds in the first year and decreasing it still more the second year. As a responsible and ethical educational leader, you may have considerable ownership of the problem situation. But what are the guidelines? What types of things can you do that might help achieve the goals?

Brainstorming, individually or in groups, is often used to develop a list of resources (guidelines) or potential activities you might carry out to solve a problem. For example, teacher software piracy might be reduced by an informational program, providing money to buy enough software, threats of dismissal, and so forth. Further exploration would be needed to determine if these options were actually available to the problem solver.

Steps in Problem Solving

In this section we list a sequence of steps that may be followed in attempting to resolve a problem situation. Often we carry out some of the steps quite automatically with little conscious thought. But it can be quite helpful to consciously think about each step in problem situations that seem to be giving us trouble. (Here we are assuming the Ownership condition is satisfied; that is, you are interested in resolving the problem situation.)

1. Work with the problem situation until you have converted it into a well-defined problem; that is, until you have identified and understood the Givens, Goal, and Guidelines. This first step is a creative, higher order thinking process, which often involve considerable knowledge as well as a good sense of values. Two different people, when faced by the same problem situation, may come up with quite different well-defined problems.

2. Select and/or develop a procedure that is designed to solve the problem you have defined. This is an information retrieval and/or creative thinking step. Usually it involves both; computers may be useful in retrieving needed information. (We will discuss the idea of *procedure* more in the next section of this Chapter.)

3. Execute or cause to be executed the steps of the procedure. Sometimes this will be a mechanical, nonthinking activity, where speed and accuracy are desired and computers may be quite useful. (The executions of many mathematical procedures falls into this category.) At other times the execution of a procedure will require the best of truly human skills. (The work of a good psychotherapist falls into this category.)

4. Examine the results produced in Step 3, to determine if the problem you defined in Step 1 has been solved. If it has been solved, go on to Step 5. Otherwise, do one of the following:

    a. Return to Step 3 and recheck your work. People and machines sometimes make mistakes.

    b. Return to Step 2 and determine another approach to solving the problem you have defined.

    c. Return to Step 1 and determine another problem to be solved.

    d. Give up, or seek help from others. The problem might not be solvable, or it might be beyond your abilities, or it might be beyond the efforts you are willing to make at this time.

5. Examine the results produced in Step 3 to determine if the original problem situation has been satisfactorily resolved. If it has, you are done. If it hasn't, do one of the following:

    a. Go to Step 1 and determine another problem to be solved.

    b. Give up, or seek help from others.

Problem solving research suggests that students benefit from learning and practicing the above five-step approach to problem solving. It is applicable over a wide range of disciplines and problem-solving situations. Notice that success is not guaranteed, but that persistence increases the likelihood of success. Note also the personal nature of the five-step approach. Problem solving is a personal thing, and personal values are often central to a problem situation.

What is an Effective Procedure?

When you are able to solve a particular type of problem routinely or automatically, you have developed one or more procedures (algorithms, detailed sets of directions, recipes) for this type of problem. Computer scientists are deeply concerned with developing procedures that tell a computer how to solve a certain category of problem. We will use the phrase *effective procedure* in discussing the idea of a procedure that can be carried out in an automatic, nonthinking, computer-like mode.

More formally, an effective procedure is a detailed, step-by-step set of instructions having the two characteristics:

1. It is designed to solve a specific problem or category of problems.

2. It can be mechanically interpreted and carried out by a specified agent. Here the term "mechanically interpreted" means in a machine-like, nonthinking manner. Computer scientists are interested in situations where the agent is a computer or a computerized machine such as a robot.

Computers are important because they can rapidly, accurately, and inexpensively execute many different procedures. The number of such procedures continues to grow very rapidly through the work of researchers in all disciplines, computer scientists, and computer programmers. Thus, an understanding of the concept of effective procedure is generally considered to be an important part of computer literacy, and it certainly lies at the heart of having a general understanding of roles of computers in problem solving.

Roles of Computers

In this section we briefly examine each of the five steps one might follow in resolving a problem situation. Our intent is to point out roles of computers in each step and to briefly discuss possible curricular implications.

The first step is to understand the problem situation and work toward having a well-defined problem. This is a thinking step , drawing on one's general knowledge as well as specific information about the problem situation. That is, both a broad general education and in-depth knowledge about the specific situation are useful. Many educational leaders argue that a broad liberal arts education is useful in understanding and critically examining the wide range of problem situations one encounters in our society. Values education plays an important role here because the process of developing a well-defined problem from a problem situation often depends heavily on personal values and views.

Computer-Assisted Learning (CAL) is of growing importance in acquiring education for understanding problem situations. Research evidence strongly supports the contention that students generally learn faster in a CAL environment than they do in a conventional instructional environment. There is strong research evidence that CAL is a cost effective aid to students. The evidence is strongest in the acquisition of factual knowledge, or at the lower-order level of Bloom's taxonomy. Computerized drill and practice works!

The second step is to select and/or develop a solution procedure for the well-defined problem you have produced in the first step. You might select and retrieve a solution procedure from your head.

As an example, the problem might be to determine the number of cubic yards of concrete needed for a patio that is to be 12 feet wide, 15 feet long, and 4 inches thick. A procedure to solve this problem involves conversion of units, multiplication, and division.

S1: Convert 4 inches to feet (by dividing it by 12).

S2: Multiply the three dimensions (each given in feet) to find the number of cubic feet in the patio.

S3: Divide the answer produced in Step 2 by 27, to convert it to cubic yards.

It is important to realize that there can be many different procedures for solving a problem. Here is another approach to solve the patio problem:

S1: Convert all measurements to yards. This involves dividing the measurements given in feet by 3, and dividing the measurements given in inches by 36.

S2: Multiply the three dimensions (each given in yards) to get the number of cubic yards of concrete needed for the patio.

The mental selection and/or development of a solution procedure is a thinking process. One can gain skill in this thinking process through practice. Computers can be used to create practice situations. Many simulations or simulation/games are designed to provide practice in this problem solving step.

An alternative to retrieving a procedure from your head is to retrieve it from a library, which may contain books, periodicals, films, and so forth. Many libraries have replaced their card catalogs by computerized card catalogs. Moreover, much of the information needed is now stored in computers. One of the defining characteristics of the Information Era we are now in is the growing availability of information and the growing technology to aid in information retrieval. It is clear that computers are very important in retrieving procedures for solving problems. This strongly suggests that all students should learn to make use of these aids to information retrieval.

The third general step in resolving a problem situation is to execute or cause to be executed the procedure from the second step. As we have indicated, some procedures require a "human touch." Others can be executed mechanically, in a nonthinking fashion. A large and rapidly growing number of procedures can be executed by computers or computerized machinery.

If a computer can execute or help execute a procedure, what aspects of this procedure do we want people to learn to do mentally, assisted by pencil and paper, assisted by noncomputerized machinery, or assisted by computerized machinery? This is a very difficult question, and it will challenge our educational system for many years to come. The answer that seems likely to be widely accepted is that we want students to have a reasonable understanding of the problem being solved and the capabilities/limitations of the computerized procedure. We want students to remain in control, but we want them to work with computers rather than in competition with computers.

The fourth and fifth steps in resolving a problem situation require examining the results of your work to determine if you have succeeded. These steps require critical thinking, drawing on your understanding of the initial problem situation and the steps followed in resolving the situation. These are higher-order mental activities.

The research literature on problem solving strongly supports the idea that people get better at problem solving if they study the processes of problem solving, learn to use aids to problem solving, and practice problem solving. This suggests that students should learn to use computers as an aid to problem solving in disciplines for which computers are an useful aid. They should practice solving problems, making use of computers when their use is appropriate to the problems being solved.

Software

In a broad sense, all computer software can be considered as problem solving software. But when we think of preparing teachers and/or students to deal with computers in schools, problem solving software tends to fall into three main categories:

1. Programming languages such as assembler, BASIC, C, COBOL, Logo, Pascal and Pilot.
2. Application packages, such as a graphics, spreadsheet, or database package. Some application packages are useful across many disciplines, so we call them "generic." Others are useful in quite limited contexts (such as software for writing music).
3. Simulations/games specifically designed to help students learn specific problem solving techniques.

There are hundreds of programming languages. In all cases the intent is to make it possible for a human to communicate with a computer. Usually a programming language is designed to meet the needs of a particular category of computer programmers. For example, BASIC was originally designed for college students, COBOL was designed for business data-processing programmers, and Pilot was designed for writing Computer-Assisted Instruction materials.

In all cases one uses a programming language to specify procedures to solve certain categories of problems. This is a very important concept. The writing of a computer program to solve a problem requires both a knowledge of a specific programming language and skill in developing procedures to solve problems. The latter is called *procedural thinking* and is generally considered to be an important component of computer literacy. Skill in procedural thinking is independent of any particular programming language. Indeed, one can develop a high level of procedural thinking skill independently of whether computers are available or whether computer programming is used to represent the procedures.

Computer-in-education leaders have not reached consensus as to which students should receive instruction in computer programming, at what grade levels, or using which particular programming language(s). For example, many school systems have decided to provide instruction in Logo to all of their elementary school students. Other districts have decided to include some BASIC in a junior high or middle school computer literacy course required of all students. Still other school districts have decided that computer programming is best left as an elective course, perhaps mainly available to secondary school students who have had a reasonably strong mathematics preparation.

Applications software may be generic (useful over a wide range of disciplines or problem areas) or it may be quite specific to the problems in a particular discipline. A computer graphics package is useful over a wide range of disciplines, while music composition software has much more limited applicability. A trend has begun to emerge, and it seems likely to continue. Many school districts have decided that all students should learn to use a variety of generic applications software. The use of such software will be integrated into the total curriculum. Initial instruction may be in a variety of courses at a variety of grade levels, or it may be concentrated into a single computer literacy course.

At the same time there is growing realization that each discipline has its own applications software. Thus, as students study a discipline at a higher and higher level, they need to receive specific instruction in use of the applications software of the discipline. Thus, two types of computer literacy are emerging. A computer literate student uses generic computer applications software as appropriate in working with problems in every academic area. As a student progresses to higher levels or greater depths in any particular discipline, the student becomes more and more computer literate within that specific discipline.

For example, a student who takes college preparation courses in chemistry and physics should be learning quite a bit about applications software specific to the fields of chemistry and physics. Microcomputer-based laboratory (MBL) software falls into this category.

There are many general purpose problem-solving techniques. For example:

1. Plan ahead, anticipating the consequences of proposed actions.

2. A large, complex problem can often be solved by breaking it into several smaller, less complex problems.

3. It is often helpful to draw a picture or map, or in some other manner graphically represent the problem under consideration.

4. It is often helpful to write down the steps you take in an attempt to solve a problem.

Many different simulation/games software packages have been developed to give students practice in particular problem solving techniques. Research into the value of such software is sparse. The main difficulty seems to be the issue of transfer of learning. For a particular simulation/game, it is evident that students get better as they practice using the software. That is, they get better at applying particular techniques in the context of the simulation/game under consideration. But there appears to be relatively little transfer of the techniques to other problem solving situations. It seems likely that the teacher plays a very important role in helping to increase such transfer of learning. A teacher can provide a wide variety of examples, suitable to the academic level and interests of a particular student, where the techniques are applicable. A teacher can help encourage students to apply the problem solving techniques they have studied to the variety of problems they encounter throughout the school day.

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Georgia Studies of Creative Behavior
Dept. of Educational Psyhology
The University of Georgia
Athens, GA 30602

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INITIATING/PLANNING AN INSERVICE

3.1

Preliminary Planning and Activities

This section consists of some general ideas followed by the project staff in setting up the workshops. Although some of the ideas are useful primarily to people who are working in a relatively formal environment such as a funded project, others apply to any inservice activity.

Many inservices are open to all educators in a district or region, perhaps subject only to certain prerequisites. But research on effective inservice points to the value of peer support within a school or department. Thus, there is considerable merit in having a number of participants from a single school. The NSF project set guidelines of having at least 3 - 5 or more participants from each school, including a school administrator. While it was not always possible to adhere to these guidelines, they served as an aid in the participant screening process.

Needs Assessment

The starting point for planning an inservice is to determine the need(s) that will be addressed by the inservice. (That is, what educational problem is being attacked through the inservice?) Chapter 1.1 discusses some of the needs that an inservice might address. The question is, how are needs determined?

Ideally, a school district would have a carefully developed long-range plan for instructional use of computers. Detailed information on the development of such a plan is given in Moursund and Ricketts (1988). The appropriate development of such a long-range plan involves participation by all of the stake holders. Thus, teachers, school administrators, parents, etc. all have ample opportunity to provide input.

A long-range plan calls for certain actions to be taken. Generally, these actions will include acquisition of computer facilities, acquisition or development of software, courseware, and curriculum materials, and *staff development*. That is, the process of developing a long-range plan can play a major role in doing a needs assessment for a computer inservice. One merely points to the long-range plan and says "We need to do this particular inservice because of the key role it plays in implementation of the plan."

There are, of course, other approaches to needs assessment. And even if one has a well done long-range plan, these other approaches are useful and should be followed. Generally speaking, a needs assessment should be done using both a bottom up and a top down approach. The bottom up approach is to obtain information from the people who are to be inserviced. The top down approach is to obtain information from the administrators of the people who are to be inserviced. Such information can be obtained by personal interviews, use of questionnaires, informal conversations, etc. Part 5 of this Notebook contains some needs assessment instrumentation.

The needs assessment will answer a variety of questions such as:

1. What are the demographics of the group of potential participants in the inservice?
2. What level of interest is displayed by the group of possible participants?
3. What are suitable meeting times, places, length of sessions, and number of sessions for the potential participants?
4. What incentives, such as college credit, release time, improved access to computers in their schools and classrooms, etc. are needed to secure there will be an appropriate number of participants?
5. What is the level of support from the administrators of the potential participants? Does this level of support include release time for teachers, appropriate materials, appropriate staff support to develop and conduct the inservice, etc? Does it include making appropriate computer facilities available to the participants in their schools and classrooms during and after the inservice? Does it include actually participating in some or all of the inservice sessions themselves?

Staffing

Most people who organize and present inservices are trained and experienced teachers. But facilitating an inservice is quite a bit different from teaching a class of precollege or college students. Also, the inservice participants will all be educators themselves. Educators expect that the inservices they participate in will be models of excellence. They are not very tolerant of poor organization and teaching. Most teachers find that teaching teachers is much more difficult than teaching other groups of students.

We have two recommendations. First, don't attempt to do a hands-on inservice (such as discussed in this Notebook) without an assistant. Your assistant may be someone you are helping to train as an inservice facilitator or a computer coordinator from one of the schools participating in the inservice. Once participants get into a hands-on mode, there will be many more questions than a single facilitator can handle. Of course, having participants work in pairs will help some. Emphasize that participants are to work quite hard to discover the answers to their questions before they seek help from the workshop facilitator or assistant.

Second, plan to spend at least 8 - 12 hours preparing for each two-hour inservice. Many teachers are used to planning a whole day's teaching in an hour or so. But a staff development workshop is quite different. Here you will be working with your peers, and you want to do an excellent job. Here also you are doing something new—you have not offered the workshop a number of times before. *It will take a lot of hard work to be adequately prepared to facilitate the workshop sessions.*

Some Initial Ideas

Let's assume you have decided to conduct an inservice and that you have a general topic and audience in mind. You do a needs assessment and conclude both that you will be able to obtain appropriate participants and that you will have appropriate administrative support. You have a staff (it might be only a part-time secretary, a volunteer, or members of a district computer committee) who will be involved in the overall planning and implementation process. You have selected an assistant who will help during the inservice presentations. You have a good idea of how the inservice will contribute to accomplishing the district's overall plans for computers in education.

The following list of ideas may help you as you continue the planning and development of the inservice.

1. Meet with your staff early and often. Have them participate in the overall planning process as much as possible. This helps to keep them informed (so they can respond to telephone inquires when you are not available, for example) and increases their "ownership" in the overall task.

2. Establish guidelines for selecting the schools and individuals who will participate. Check these guidelines with the funding agency or group responsible for making the inservice possible. If you are not the computer coordinator for the region to receive inservice, check with the computer coordinator.

3. Communicate with the potential participating schools and individuals. This may be done via a combination of mail (regular and electronic), announcements in newsletters, phone calls, and direct contact. Indicate generally the desired nature of school and individual participants, and indicate where and when an information meeting will be held.

4. Prepare for and conduct the information meeting. You will want to have a handout containing key information that possible individual and school participants need to know, which may include appropriate application forms. Hold the informational meeting early, so that possible participants from each school will have time to have an in-school meeting to decide if they will participate.

5. If you are giving university credit to the participants, make sure you have everything coordinated with the university or college as well as the school district(s). This process can take some time, so begin early.

6. Your inservice will use of a variety of software. You will need multiple copies and/or permission from publishers to do multiple loading. Make sure that you begin the process of obtaining the software and/or permissions early enough so that this task is completed well before the inservice is scheduled to begin.

   The choice of software can be a major decision. Should you use software readily available to teachers, or should you use the "latest and greatest"? An inservice must be grounded in reality. Thus, much of the software used should be software to which teachers have easy access. But an inservice should also be forward looking. Thus, it is appropriate to use some software that may be new to teachers in your school or district.

   To a large extent, the NSF project used software from the Minnesota Educational Computing Consortium (MECC). This was done because such software is in wide use throughout North America and because it was available in the school district where the inservices were being conducted. However, we also obtained multiple copies of some software on loan from certain vendors, and we obtained permission to do multiple loading from certain other vendors. Our experience was that vendors are very supportive of staff development efforts.

7. Your inservice may make use of print materials that will need to be ordered from publishing companies or reproduced. It can easily take a month to obtain print materials from a publishing company, begin this process well in advance of the starting date for your inservice.

8. Think about where and when the inservices are to be conducted. From the point of view of the inservice organizer, it is easiest to conduct all inservices at one central site, and to hold them at a time that "seems" convenient to the organizer. However, participants may gain more ownership and overall involvement if the inservices are conducted in their schools.

This involves holding inservices at a number of different sites with varying equipment facilities. It involves holding inservices at a time that the potential participants have indicated fits their needs.

Miscellaneous Suggestions to Inservice Facilitators

1. At the first meeting of the inservice, be well organized. Have name tags available, appropriate refreshments, etc. Be efficient and business-like. If appropriate, provide each participant with a list of the names, addresses, and phone numbers of the participants and the facilitators.

2. At the first meeting of the inservice you will most likely want to have a number of things to hand out. These might include:

   a. A notebook for participants to keep materials in, with colored paper or dividers to separate the lessons.

   b. The types of materials illustrated in this Notebook. (Some inservice facilitators prefer to hand out all materials during the first session, while others prefer to hand out each session's materials at the start of that session.)

   c. Other print materials, such as books, that participants will need during the inservice.

   d. Some software, if it is appropriate. For example, there may be some excellent public domain software that is suitable for participants in the inservice. Participants like to receive free materials.

   e. A syllabus for the inservice.

3. Much of the material you hand out may be forms that you want participants to write on during the inservices. If so, make sure participants know that extra copies of these pages in the handout can be "ordered" from you so that they feel free to write on them during the sessions. Have a form available to them, so they can order copies as needed, or just provide them extra copies in an automatic fashion.

4. The computer is a powerful tool and a powerful change agent in education. Both the overall educational system and individual educators are (in general) resistant to change. The inservice facilitator should deal openly with change processes and resistance to change. This should be a reoccurring theme in the debriefing at the end of each activity. Spend some time thinking about educational change. How do you feel in your role as a facilitator of change?

5. Student/teacher modes. The style of inservice described in this Notebook has the participants sometimes play the role of "students" and other times play the role of "teachers." Make the participants aware that at times they will be students and at other times teachers during the inservice sessions, and why the inservice is designed in this way. This switching of modes can be confusing, so make it clear when you are having participants switch roles.

6. The style of inservice described in this Notebook is heavily oriented toward discovery based learning. Be aware that relatively few teachers are comfortable with discovery based learning. Think about why discovery based learning is particularly appropriate in computer education and in this inservice. Raise this as a topic for discussion quite early in the inservice, and raise it several additional times during later inservice sessions.

7. Transfer of learning is a very important idea in computer inservices. The goal is that participants will take ideas from the inservice and implement them in their classrooms. Raise this as a topic for discussion during the first inservice session and bring it up again at subsequent sessions. It is quite appropriate to ask in the second and subsequent sessions "Would one of you please share with us some classroom uses you made this week of the ideas that we covered in the last session?" Do everything you can to encourage such immediate implementation and the sharing of successful implementations.

8. Keep in mind that problem solving is a central and unifying theme in the inservice and is the main reason why computers are coming into schools.

    a. The computer-as-a-tool is essentially the computer as an aid to problem solving. Problem solving should be a central theme in every activity and in every debriefing.

    b. Many of the changes that may occur as computers come into schools are changes that could/should occur even without computers. A typical example is increased emphasis on problem solving in math and decreased emphasis on rote computation. Another example is increased emphasis on the overall writing process (process writing) and less emphasis on the mechanics of writing, such as spelling and grammar.

9. Preparation time. (Here we are repeating some ideas given earlier in this chapter, because they are particularly important.) The novice inservice facilitator may wonder how much work is involved in preparing to facilitate a sequence of inservice sessions. Of course, a lot depends on the standards the person sets. Also, the time depends heavily on the overall knowledge of computers, computers in education, the subject discipline of the teachers to be trained, and the software to be used. The experiences of the NSF graduate assistants who did almost all of the presentations during this project have shown that even a highly qualified inservice facilitator can easily spend 8 - 12 hours preparing for a two-hour inservice. (*Note: It doesn't take nearly this long to prepare for subsequent presentations of the same inservice.*) Access to materials such as those in this Notebook can decrease preparation time somewhat and can add to the overall quality of an inservice. But to a very large extent, the quality of an inservice depends on the quality, experience, and preparation of the facilitator.

References

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3.2

Sample Timeline Outline

The final format of the NSF inservice sessions discussed in this Notebook was a sequence of two hour sessions. The sessions were held immediately after school, typically from 3:30 - 5:30 or 4:00 - 6:00 in the afternoon, one day per week.

Through careful thought, trial and error, and experience, we gradually developed a Sample Timeline for the organization of a two hour session. In essence, this Sample Timeline consists of a model for a one hour session, and the model is followed twice for a two hour session. This way of building longer sessions from a one hour session can be further extended to still longer inservice sessions.

The outline given below suggests specific amounts of time for the various parts of an inservice session. However, flexibility is important. The actual time spent on any given activity will depend on the activity, the facilitator, and the participants.

Minutes allotted	Activity
10	*Starting activity*. Have participants either work on an off machine activity or on the computers with software that is fairly self-explanatory. Make use of an appropriate Performance Aid.
5	Debriefing of the above activity.
25-35	*First major activity for the session*. This is time for the participants to be on the computer. It can be a more in-depth continuation of the starting activity, or it can be a new piece of software.
10-15	Debriefing of the above activity.
10	A short break for stretching, coffee, cookies, other refreshments, and informal conversations. Generally speaking, there is never enough time to accomplish the aims of an inservice program. Don't let the break time stretch too much!
30-35	*Second major activity*. Again, participants will be using the computer in most such activities. However, sometimes off machine activities are quite appropriate.
10-15	Debriefing of the second major activity.
10	*Closure*. Summarize what was accomplished during the day; any additional comments from the participants or yourself; details of the next meeting.

This general outline is only meant to serve as a starting point for organizing a two-hour session. There may be certain sessions where the debriefing and discussion is of more importance than hands-on time. In those cases the facilitator should adjust the schedule as necessary. In other cases an off-machine activity may be more appropriate than a hands-on activity.

A key concept in the CI^3 model is a discovery-oriented approach. Most inservice facilitators are quite used to delivering lectures that cover a given body of material. But the amount of straight lecture time in a two-hour session such as outlined above should probably be less than ten minutes!

Rather than lecture, the inservice facilitator facilitates. Participants spend the bulk of their time in two modes. The first is a hands-on mode, usually working in groups of two at a machine. This is a learn by doing environment. Participants are encouraged to answer their own questions by a combination of trial and error, reading the Performance Aids and other handouts, and asking each other. When the inservice facilitator must intervene, it should be as a facilitator rather than as an answer provider.

The second major participant mode is group discussion, sometimes in small groups and sometimes in a whole-class group. Many teachers have had relatively little experience in facilitating small-group and large-group discussions. (A good way to gain experience is by working with a group of educators. This is because once a facilitator gets educators started talking, it is hard to get them to stop!) A good rule of thumb is that the facilitator should talk less than half of the time during a group discussion.

The group discussion debriefing sessions must lead to discovery or reiteration of the major points covered. Thus, the facilitator must have these points in mind. As participants make comments that relate to the major points, the facilitator must seize these opportunities to make sure that these points have been discovered and comprehended by all participants. Initially, many inservice facilitators find that this is harder to do than to just delivering a straight lecture. But, with practice, it becomes an enjoyable and relatively easy mode of instruction.

EIGHT-SESSION
SECONDARY SCHOOL
SOCIAL STUDIES
INSERVICE

4.0
Software Bibliography

There is an immense number of pieces of software that might be useful in a computer inservice for secondary school social studies teachers. New pieces of software are being produced, and some older pieces are disappearing from the market place. This section lists most of the software used when this NSF social studies inservice was conducted during the 1987-88 academic year. Prices, as well as availability, tend to change rapidly.

But this style of summarizing a software bibliographic reference should prove useful in the future. If an inservice is of sufficient length, participants can be asked to examine additional pieces of software for inclusion in the list. (Note: The disk that accompanies this Notebook contains a file with a much larger software bibliography. We decided not to include hard copy of the larger bibliography, Social Studies Subfolder 4.9 Software Notebook, in order to save printing costs.)

BANK STREET SCHOOL FILER

Grade: 4 - 12 **Topic:** Database **Unit Cost:** $99.00

Copyright Date: 1986

Instructional Techniques:

Drill & Practice _____ Tutorial _____ Simulation _____

Arcade Game _____ Educational Game _____ Database __√__

Problem Solving _____ Management System _____

System Requirements: Apple II, IIe, IIc; Commodore 64

Requires 64 K Memory (128K available for Apple II, IIe, and IIc)

Description: Bank Street School Filer is an easy-to-use database package specially designed for the classroom.

For students, this program offers a means of developing critical thinking skills through collecting and organizing information. It lets them form and test hypotheses, and manipulate information in ways that usually are not possible with paper and pencil alone.

For teachers, this program is an administrative tool to help keep track of such things as student records, overdue library books, and class trips. *(Taken from the vendor's program description)*

External Documentation:

	YES	NO
Teacher's Guide/Manual	√	
Student Booklet/Material	√	
Work/Activity Sheets	√	
Lesson Plans Suggested	√	
Follow-up Activities	√	

Permission or Sanctions of Use:

1. You have permission to reproduce any student worksheets in the guide for your classroom use. You should ***not***, however, copy the whole guide.
2. You have permission to use Lab Packs at ***one*** site. You should ***not***, however, divide the package and use the diskettes in more than one building.
3. Depending on the type of computer you have, this program may "load" all at once. If it does, you have permission to move the diskette from one computer to another. This means that if you have 128K machines, a single copy of the software can simultaneously be used by all machines. However, you may not ***copy*** the diskette. (A back-up disk is provided.)

Policies of Vendor:

Preview: FREE 30-day trial

Back-up: Back-up disks are included with the program.

Replacement: FREE OF CHARGE, if any program component is lost or damaged during normal school use. (This warranty applies as long as the program is offered for sale).

Return: The program may be returned within a reasonable amount of time. An explanation as to why the program is being returned must be included.

Disk Use (Multiple Loading): Depending on the type of computer you have, this program may "load" all at once. If it does, you have permission to move the diskette from one computer to another.

Cost:

Individual Packets: $99.00

Replacement: See Warranty

10-Disk Lab Pack: $297.00 (Sunburst will fill orders for customized lab packs to meet individual special needs)

Networking Disks: Not available

Site License: Not available

District Purchase Plan: For distribution throughout an entire school district call Sunburst's Customer Service number.

Publisher: Sunburst Communications, INC

Address: Room #GR 31
39 Washington Avenue
Pleasantville, NY 10570-9971

Customer Service Number: (800) 431-1934

Warranty: Lifetime guarantee

NORTH AMERICA DATABASE DISK

Grade: 4 - 12 **Topic:** North America **Unit Cost:** $59.00

Copyright Date: 1986

Instructional Techniques:

Drill & Practice _____ Tutorial _____ Simulation _____

Arcade Game _____ Educational Game _____ Database __√__

Problem Solving _____ Management System _____

System Requirements: Apple II, IIe, IIc; Commodore 64.
Use with Bank Street School Filer. At least one (1) printer is recommended.

Requires 64 K Memory

Description: The Database Disk explores many facets of North American life - its people, geography, political systems, climate and economy. The databases can be used separately, since each is rich enough to stand on its own, or they can be used to complement one another. *(Taken from the vendor's program description).*

External Documentation:

	YES	NO
Teacher's Guide/Manual	√	
Student Booklet/Material	√	
Work/Activity Sheet	√	

Lesson Plans Suggested	√	
Follow-up Activities	√	

Permission or Sanctions of Use:

1. You have permission to reproduce any student worksheets in the guide for your classroom use. You should ***not***, however, copy the whole guide.
2. You have permission to use Lab Packs at ***one*** site. You should ***not***, however, divide the package and use the diskettes in more than one building.

Policies of Vendor:

Preview: Free 30 day trial

Back-up: Included with the program

Replacement: FREE OF CHARGE, if any program component is lost or damaged during normal school use. (This warranty applies as long as the program is offered for sale).

Return: The program may be returned within a reasonable amount of time. An explanation, as to why the program is being returned, must be included.

Disk Use (Multiple Loading): You are encouraged to copy individual files (or the entire disk) onto a regular disk. Then you may add to the files or adapt them to suit your needs.

Cost:

Individual Packets: $59.00

Replacement: Free of charge

Lab Pack: $177.00

Networking: Not available or necessary

Site License: Not available or necessary

District Purchase Plan: Call Sunburst's Customer Service number with specific requests.

Publisher: Sunburst Communications INC

Address: Room #GR 31
39 Washington Avenue
Pleasantville, NY 10570-9971

Customer Service Number: (800) 431-1934

Warranty: Lifetime guarantee

UNITED STATES DATABASE DISK

Grade: 4 - 12 **Topic:** United States **Unit Cost:** $59.00

Copyright Date: 1986

Instructional Techniques:

Drill & Practice _____ Tutorial _____ Simulation _____

Arcade Game _____ Educational Game _____ Database __√__

Problem Solving _____ Management System _____

System Requirements: Apple II, IIe, IIc; Commodore 64

Requires 64 K Memory (128 K also available)

Description: United States Databases contain geographic, political and historical information for each of the United States. A travel database provides the format for students to build a personal database by entering information on their own travel in the United States. The package is designed to be used with the Bank Street School Filer, a database program. However, the databases can be used separately, since each is rich enough to stand on its own, or they can be used to complement one another. *(Taken from the vendor's program description).*

External Documentation:

	YES	NO
Teacher's Guide/Manual	√	
Student Booklet/Material	√	
Work/Activity Sheets	√	
Lesson Plans Suggested	√	
Follow-up Activities		√

Permission or Sanctions of Use:

1. You have permission to reproduce any student worksheets in the guide for your classroom use. You should ***not,*** however, copy the whole guide.
2. You are encouraged to copy individual files (or the entire disk) onto a regular disk. Then you may add to the files or adapt them to suit your needs.

Policies of Vendor:

Preview: Free 30 day trial

Back-up: Included with the program

Replacement: FREE OF CHARGE, if any program component is lost or damaged during normal school use. (This warranty applies as long as the program is offered for sale).

Return: The program may be returned within a reasonable amount of time. An explanation as to why the program is being returned must be included.

Disk Use (Multiple Loading): You do not have permission to multiple load this program.

Cost:

Individual Packets: $59.00

Replacement: See warranty

10-Disk Lab Pack: $177.00 (Sunburst will fill orders for customized lab packs to meet individual needs).

Networking: Not available

Site License: Not available

District Purchase Plan: For distribution throughout an entire school district, call Sunburst's Customer Service number.

Publisher: Sunburst Communications, INC

Address: Room #GR 31
39 Washington Avenue
Pleasantville, NY 10570-9971

Customer Service Number: (800) 431-1934

Warranty: Lifetime guarantee

THE OTHER SIDE

(Global Conflict Resolution)

Grade: 5 - 12 **Topic:** Peace **Unit Cost:** $69.95

Copyright Date: 1985

Instructional Techniques:

Drill & Practice _____ Tutorial ____ Simulation __√__

Arcade Game _____ Educational Game _____ Database _____

Problem Solving _____ Management System _____

System Requirements: Apple IIe, II+, IIc; IBM PC/PCjr

Requires 64 K Memory

Description: The *Other Side* simulates real-world conflict situations in your classroom. You divide your students into two teams, each representing an independent nation, and then the teams try to build a bridge uniting the world. But at every step intrigue, mistrust and the reality of limited resources threaten the bridge - and the peace. *(Taken from the vendor's program description).*

External Documentation:

	YES	NO
Teacher's Guide/Manual	√	
Student Booklet/Material	√	
Work/Activity Sheets	√	
Lesson Plans Suggested	√	
Follow-up Activities	√	

Permission or Sanctions of Use: None stated

Policies of Vendor:

Preview: 30 days (The program must be sent to a school address.)

Back-up: Included with the program

Replacement: After the warranty period, a new program must be purchased if the disk is destroyed by the purchaser. If the disk crashes, contact Tom Snyder Productions.

Return: 30 days from date of purchase

Disk Use (Multiple Loading): Since the program is designed to be used as a one or two computer simulation, multiple loading is not necessary.

Cost:

Individual Packets: $69.95

Replacement: No set price

Lab Pack (10 disks + all other materials): $210.00

Networking: Not available or necessary

Site License: Not available

District Purchase Plan: Not available

Publisher: Tom Snyder Productions

Address: P.O. Box 2554
123 Mt. Auburn Street
Cambridge, MA 02238

Customer Service Number: (800) 342-0236 In MA (617) 876-4433

Warranty: 90 days from date of purchase

PRESIDENT ELECT

Grade: 4 -12 **Topic:** Presidential Elections **Unit Cost:** $24.95

Copyright Date: 1986

Instructional Techniques:

Drill & Practice _____ Tutorial ____ Simulation __√__

Arcade Game _____ Educational Game _____ Database _____

Problem Solving _____ Management System _____

System Requirements: Apple II with Applesoft ROM, II+, IIe, and IIc

Requires 48 **K Memory**

Description: *President Elect* is a computer simulation of a presidential campaign from Labor Day to Election Night. The game can be played by up to three players, each assuming the role of campaign manager/candidate. The game proceeds through nine weekly turns, in which the players decide where and how to concentrate their campaign efforts. Weekly polls are provided to give the players a rough idea of how they are doing, and to help them determine where to concentrate their campaigning efforts. *(Taken from the vendor's program description).*

External Documentation:

	YES	NO
Teacher's Guide/Manual	√	
Student Booklet/Material		√
Work/Activity Sheets		√
Lesson Plans Suggested		√
Follow-up Activities		√

Permission or Sanctions of Use: The program accompanying the Rule Book may be copied, by the original purchaser only, as necessary for use on the computer for which it was purchased. The Rule Book may ***not*** be copied without prior permission.

Policies of Vendor:

Preview: Not possible

Back-up: If you are unable to make a back-up copy of your disk, you may purchase a back-up disk from SSI for $10.00 + $2.00 for shipping and handling.

Replacement: Free within 60 days of purchase.

Return: Defective disks will be replaced free of charge within the 30 day warranty period. After 30 days, disks will be replaced for $10.00.

Disk Use (Multiple Loading): Not possible

Cost:

Individual Packets: $24.95

Replacement: $10.00

Lab Pack: Not available

Networking: Not available

Site License: Not available

District Purchase Plan: Not available

Publisher: Strategic Simulations, Inc.

Address: 1046 N. Rengstorff Ave.
Mountain View, CA 94043

Customer Service Number: (415) 964-1353

Warranty: 30 days from date of purchase

EASY GRAPH II

Grade: 3 - 9 **Topic:** Graphing **Unit Cost:** $59.95

Copyright Date: 1987

Instructional Techniques:

Drill & Practice _____ Tutorial __√__ Simulation _____

Arcade Game _____ Educational Game _____ Database _____

Problem Solving _____ Management System _____

System Requirements: Apple II, IIe, IIc, II+, or IIgs; Printer (optional)

Requires 64 K Memory

Description: Easy Graph II is a computer graphing tool that will teach your students how to read, understand and create graphs of their own. They can make, print, and save four different kinds of graphs to a blank data disk: pictographs, bar graphs, pie charts, and line graphs. *(Taken from the vendor's program description).*

External Documentation:

	YES	NO
Teacher's Guide/Manual	√	
Student Booklet/Material		√
Work/Activity Sheets		√
Lesson Plans Suggested	√	
Follow-up Activities	√	

Permission or Sanctions of Use: None Stated

Policies of Vendor:

Preview: 30-day approval period

Back-up: Included with the program

Replacement: After 90 days, replacement diskettes are available for $11.00, postpaid. The inoperative diskette(s) must be returned with your order for the replacement.

Return: 90 days

Disk Use (Multiple Loading): N/A

Cost:

Individual Packets: $59.95

Replacement: $11.00

Lab Pack (6 Program Disks & 1 Instructor's Guide): $120.00

Networking: Contact Grolier with specific requests.

Site License: Contact Grolier with specific requests.

District Purchase Plan: Contact Grolier with specific requests.

Publisher: Grolier Electronic Publishing

Address: Dept. 337, Sherman Turnpike
Danbury, CT 06816

Customer Service Number: (800) 858-8858 In CT (203) 797-3530

Warranty: 90 days from date of purchase

THE J & S GRADE BOOK

Grade: N/A **Topic:** Teacher Utility **Unit Cost:** $49.50

Copyright Date: 1987

Instructional Techniques:

Drill & Practice _____ Tutorial ____ Simulation _____

Arcade Game _____ Educational Game _____ Database _____

Problem Solving _____ Management System __√__

System Requirements: Apple IIe, IIc, IIgs, II+; DOS 3.3

Requires 48 K Memory

Description: Twice as fast as most grade books. Many new features such as - Keeping track of each semester's grades and then calculating the term's grades. - Print a grade book page that looks like your grade book. - Print progress reports containing all student grades, your comments, your attitude categories and more. *(Taken from the vendor's program description).*

External Documentation:

	YES	NO
Teacher's Guide/Manual	__√__	_____
Student Booklet/Material	_N/A_	_____
Work/Activity Sheets	_N/A_	_____
Lesson Plans Suggested	_N/A_	_____
Follow-up Activities	_N/A_	_____

Permission or Sanctions of Use: The manual may be reproduced.

Policies of Vendor:

Preview: 30 days

Back-up: Included with the program

Replacement: Replaced at no cost in the event of any defect, within one year from purchase.

Return: Within 30 days from date of purchase

Disk Use (Multiple Loading): N/A

Cost:

Individual Packets: $49.50

Replacement: $10.00

Lab Pack: Call J & S Software for special pricing for schools ordering 10 or more.

Networking: N/A

Site License: N/A

District Purchase Plan: Call J & S with specific requests.

Publisher: J & S Software

Address: Vanderventer Avenue
Port Washington, N.Y. 11050

Customer Service Number: (516) 944-9304

Warranty: 1 year

TIMELINER

Grade: K - 12 **Topic:** Utility **Unit Cost:** $59.95

Copyright Date: 1986

Instructional Techniques:

Drill & Practice _____ Tutorial ____ Simulation _____

Arcade Game _____ Educational Game _____ Database _____

Problem Solving _____ Management System _____ Tool __√__

System Requirements: Apple II Family; IBM Family; A printer

Requires 64 K Memory

Description: *Timeliner* is a practical, easy-to-use tool. It lets teachers and students create their own personal and historical time lines, and gives them a visual sense of the patterns of history.

Students can build and print out time lines of any length, and for any topic. For example, they can construct time lines of their own lives, their family, the history of their school, town and state, as well as any period of history. By using *Timeliner's* special merge feature, they can combine and print out any combination of time lines to develop many new perspectives on history. *(Taken from the vendor's program description).*

External Documentation:

	YES	NO
Teacher's Guide/Manual	√	
Student Booklet/Material		√
Work/Activity Sheets	√	
Lesson Plans Suggested	√	
Follow-up Activities	√	

Permission or Sanctions of Use: None stated

Policies of Vendor:

Preview: 30 days (The program must be sent to a school address).

Back-up: Included with the program

Replacement: After the warranty period, a new program must be purchased if the disk is destroyed by the purchaser. If the disk crashes, contact Tom Snyder Productions.

Return: 30 days from date of purchase

Disk Use (Multiple Loading): Multiple loading is encouraged in a computer lab setting.

Cost:

Individual Packets: $59.95

Replacement: No set price

Lab Pack (10 disks + all other materials): $180.00

Networking: Not available

Site License: Not available

District Purchase Plan: Not available

Publisher: Tom Snyder Productions

Publisher: Tom Snyder Productions

Address: P.O. Box 2554
123 Mt. Auburn Street
Cambridge, MA 02238

Customer Service Number: (800) 342-0236 In MA (617) 876-4433

Warranty: 90 days from date of purchase

U.S. HISTORY

Grade: 10 - 12 **Topic:** History **Unit Cost:** $39.95

Copyright Date: 1986

Instructional Techniques:

Drill & Practice _____ Tutorial ____ Simulation _____

Arcade Game _____ Educational Game __√__ Database _____

Problem Solving _____ Management System _____

System Requirements: Apple II, II+, IIe, IIc; or Franklin Ace 1000

Requires 48 K Memory

Description: This program was written by a U.S. History teacher as a way to stimulate interest in and encourage a better understanding of significant people and events in American history. The program includes questions that require both factual and inferential comprehension. *(Taken from the vendor's program description).*

External Documentation:

	YES	NO
Teacher's Guide/Manual	√	
Student Booklet/Material		√
Work/Activity Sheets		√
Lesson Plans Suggested		√
Follow-up Activities		√

Permission or Sanctions of Use: The Master disk is copyrighted and may *not* be copied. The Data disk is also copyrighted but copies of it may be made.

Policies of Vendor:

Preview: 30 day unconditional

Back-up: Included with the program

Replacement: Free within 60 days of purchase

Return: Within 30 days and in resalable condition

Disk Use (Multiple Loading): Not possible

Cost:

Individual Packets: $39.95

Replacement: $10.00/disk

Lab Pack (5 Master Disks + 1 Manual): $79.95

Networking: Available only for Corvus Omni-Net

Site License: Not Available

District Purchase Plan: Not Available

Publisher: Hartley Courseware, Inc.

Address: 133 Bridge Street
Dimondale, MI 48821

Customer Service Number: (800) 247-1380

Warranty: 60 days

4.1
Session 1: Introducing Databases

4.1.1 Narrative Overview

The Information Age officially began in the United States in 1956. In that year the number of people employed in Industrial Age manufacturing jobs became less than the number employed in service jobs and information processing types of jobs. Now, more than 30 years later, we find that less than 20% of the employment in the United States is in manufacturing jobs, while over 70% is in service jobs and information processing jobs.

This represents a massive change in the nature of employment. It has had a major impact on our society. Of course, students enrolled in secondary school social studies classes may not see the change, since their entire lives have been lived during the Information Age. This presents an interesting set of challenges to the social studies teacher.

Technology is a major driving force, producing massive changes in our society. Computer-related technology and its impact on our society is thus suitable content for social studies.

But computer-related technology can enter the social studies classroom in another way. Computers are a valuable aid to studying and attempting to solve a wide range of social studies problems. Computers are very useful for the storage, manipulation, and retrieval of information. Databases, computer graphics, and computer modeling (simulations) are all very important tools for social scientists.

This sequence of eight inservice sessions is designed to introduce social studies teachers to some of the tool-uses of computers. That is, [illegible] emphasis is on roles of computers as an aid to solving social studies problems. Problem solving is a higher-order skill. It is recommended that you reread the chapter on problem solving given earlier in this book. If you are a social studies teacher, do some introspection. To what extent do you teach problem solving in your social studies classroom? Do you stress inquiry methods, hypothesis generation and testing, research methods, etc? Are your tests mainly requests for facts, or do they require deeper understanding and careful analysis on the parts of students? Research strongly suggests that students adjust to the testing style that teachers use. If teachers give lower-order skills types of test questions, students will gain the lower-order skills. If teachers ask higher-order skills types of questions, students will gain higher-order skills.

The inservice facilitator should be aware that many social studies teachers tend to emphasize rote memory more than problem solving, inquiry, and discovery-based learning. This presents the inservice facilitator with the dual task of both teaching tool uses of computers and teaching a different approach to learning social studies. It is a major but enjoyable challenge.

Most of the eight social studies sessions presented in this notebook are designed so that participants spend about half of their time in a hands-on mode. Quite a bit of the rest of the time is spent in small group and whole group discussions. There is a strong emphasis on facilitating to allow participants to "discover" key ideas. There is relatively little time devoted to formal lecture.

This first session is unusual because substantially less than half of the time is spent in a hands-on mode. While it is highly desirable to include considerable hands-on activity in each session, there is quite a bit of preliminary off-machine work that needs to be accomplished during the first session. For example, it is desirable to spend time helping the participants and staff get to know each other and in introducing the overall philosophy of the **Computer-Integrated Instruction Inservice (CI^3)** model.

If sessions are more than two hours in length, the extra time (beyond two hours) in the first session can be used for additional hands-on activities. A number of possible activities are suggested in the materials included here.

A key idea in the CI^3 model is the discovery-based learning that occurs through participants discussing the activities. These discussions occur as participants work together (typically in pairs) on the computer. It also occurs at the end of each hands-on activity, through a debriefing. In the debriefing, questions are encouraged and key ideas are "teased out." The inservice facilitator must have a clear idea of what key ideas are to be "discovered" by the participants.

Sometimes participants will not make observations or ask questions that lead to discovery of key ideas. In such cases the inservice facilitator may need to ask leading questions. Some sample question that can be raised to encourage discussion include:

1. What grade levels might find this software appropriate? (Can it be used in grade school? Is it too simple and limited for use in high school?)
2. If students entering the courses you teach already had a good working knowledge of uses of database software, how would it affect your courses?
3. As computers and database software become more readily available to students, how familiar should such students be with these systems?
4. What types of social studies issues or problems can be solved by use of this software? (Start to explore the difference between being able to use a tool and being able to solve problems using the tool.)
5. Will computerized databases replace part or all of the services provided by current libraries? How will changes in libraries affect students in social studies courses?
6. What facts should social studies students memorize? What general ideas should they learn? What should they learn to look up in reference materials?

During the first session, problem solving in social studies is addressed and we introduce a general model of problem solving. It contains the components:

1. Understand the (real world) problem, sometimes referred to as the givens of the problem.
2. Develop a model of the problem based upon the guidelines surrounding the problem such that a solution may be attempted.
3. Solve the problem in terms of the stated goals.
4. Compare the results with the original problem. Has the original problem been solved? Have new problems been created?

The element of personal ownership is a key idea in problem solving. If a student has little interest in a problem, then the student is not apt to be willing to do the work required to solve the problem. Teachers face a major motivational task in the social studies areas. What can you do to get students interested in solving social studies problems?

This four-step problem solving model will be brought up in nearly every session. The computer is more useful in step three than in the other steps. This is getting at the heart of how computers might affect social studies education.

Many educators support the idea of discovery based learning. Computers can be used to add another dimension to discovery-oriented instruction. However, teachers are always faced by the large amount of material in the curriculum that must be "covered." The idea of spending class time teaching students to use computers further complicates the issue. Such difficulties should be

Conventional college and university courses typically have a substantial amount of homework assigned to be done between class sessions. Facilitators of inservice courses and workshops are aware that most of the participants are working more than full-time just doing their teaching job. Thus, each facilitator must decide the nature and extent of "homework" that participants are to accomplish between sessions.

For the NSF inservices, we chose to use the idea of a "Game of the Week" as part of the homework. Each game is designed to be both academically relevant and fun. Most of the games can be accomplished in a relatively modest amount of time. This is consistent with our decision to keep required homework to a minimum.

The title "Game of the Week" is designed so that participants will not think of it as an assignment, but rather, as a challenge to do some thinking and make effective use of this inservice. There are no "winners" other than that those who do the exercises will gain greater insight into using computers in their classroom. No amount of "preaching" can change a person's mind if it is already made up. However, the games encourage participants to think about key issues and contemplate some computer-related changes in social studies education.

The Weekly Log is another approach to homework. We required participants to fill out a log sheet each week, indicating uses they have made of computers and related ideas from the inservice.

Finally we asked the participants to complete a term project. The purpose of the project is to get the participants to think about how to prepare today's students for the information age. Special emphasis should be placed on personalizing this paper rather than making it into a formal paper. It is important that they tailor their paper to address or be attentive to the unique requirements of their district, school, and classroom. This paper should be typewritten or done on a word processor and approximately eight to ten pages long. A page is approximately 1600 characters. It is due at the end of the seventh session.

The first session starts off with participants using the computer and Sunburst Communication's Bank Street School Filer tutorial. This gives the participants the opportunity to examine a database management system and get exposed to the various commands used to use the system. This database system will be used for the next three sessions so it is important that the participants become comfortable with it as soon as possible. The second computer activity has been structured so that the length of the session can be varied. This will allow the facilitator to adjust the activity to accommodate any special or administrative needs that may arise during the first session. This session's primary goal is to familiarize the participants with one database management system. The script on the next pages identifies the objectives and materials used during the inservice and how these materials were applied in an actual inservice session. Scripts for each of the eight sessions follow the same format, as does most of the other instructional material described above. Although the scripts are very detailed, there is some flexibility in the time line because the administrative, instructional, and other "house keeping" needs of any given group will differ.

4.1.2 Script

Note: This first script is more detailed than the remaining scripts. The inservice facilitator will generally want to be over prepared for the first session. It is very important to get off to a good start!

Theme: Database Management System

Objectives:

1) Give an overview of the CI^3 model.
2) Computer use objectives are:
   a) Familiarize the participants with one database management system.
   b) Using the database management system, understand the various options available for manipulating the data.
3) Instructional objective is to let the participants experience using a database as a way to classify data.
4) Provide a meaningful experience for the participants.

Abbreviations: Readers of this script and subsequent scripts should note that the following abbreviations are used.

LP—Lesson Plan
PA—Participant Aid — Detailed instructions for computer use.
HO—Handout
OV—Overhead projector

Materials:

Software Handouts
Sunburst: Bank Street
School Filer
(a class set)
Data diskPA-2 Session # 1

Refreshments

Course syllabus
PA-1 Session # 1

FrEdWriter Guidelines
FrEdWriter Disk
Name Tags
Class Registration Materials
Names and schools of all the participants.
Parking Permits
HO Readings
HO Software Review
HO Term Project Assignment
Three ring binder

Assumption: Participants have had little, if any, computer experience.

Pre-Session

1) Bank Street School Filer tutorial has been booted on each computer system and the tutorial menu screen is on the monitor.
2) PA #1 is on top of the binders which are next to each computer.
3) Have a large screen monitor or overhead projector available for demonstrations purposes.
4) Provide table space to set the participants notebooks, name tags, and registration materials on so they may conveniently be given out as people arrive.
5) Organize your performance aids and handouts in such a way that you have easy access to the material during the session.

Introduction
20 minutes

Purpose: Immediate involvement - no introductions, everything begins on time with a hands on activity. Participants work in pairs and follow instructions written on the overhead. The instructions should specify that they get seated, two people to a computer, and immediately get started following the handout materials that have been placed beside the computer. Note that it makes little difference what types of computers are being used.

Discussion
5 minutes

Pull the focus away from the computer to the inservice facilitator. This method of starting immediately will be modus operandi throughout the inservice series. Were the instructions clear? Was the tutorial informative?

Introductions
30 minutes

Purpose: To introduce the inservice facilitators and the participants. Let participants introduce themselves. The introduction should include, name, school, and what grade/subjects the person teaches. (Be sure to include any administrators present). After each introduction, one of the facilitators should give that person a name tag.

See that everyone removes the disk they have been using (here you may have to teach them how to take a disk out of a disk drive and how to handle a disk) and puts it back into the binder before the break.

If there is paperwork that needs to be done to register participants, you may want to handle these details now.

Break
10 minutes

Refreshments {Note: Remind everyone that due to time constraints, breaks will be short and that they should feel free to go to the restroom at any time as necessary. Remember, teachers are responsible adults. They should be treated as responsible adults.}

Set up:

During the break, the facilitator should boot up the computer systems using the Bank Street Filer program disk and a data disk for each computer that has the Students Datafile on the disk (See page 8-9 of Bank Street Filer manual). Place PA # 2 (one for each participant) for the second activity on top of the closed Bank Street School Filer binder.

Activity:
25 - 45 minutes
(See the directions below)

Purpose: This activity is an extension of the first activity in that it continues to expose the participant to the characteristics of a database. The participant can experience a concrete demonstration of a database and be directly involved with a database that is relevant to teachers.

Directions:

When the participants return from the break, tell them to begin the next activity by following the directions on the sheet placed next to their computer. This activity has been structured so that its length can be varied. It is actually two complementary activities grouped together. The last part of this first session has a number of other activities (see below). Each inservice location has its own special organizational needs. The flexibility of this exercise will allow the facilitator to take the variable requirement of these needs into account and adjust the length of this exercise accordingly.

Debrief:
15 - 30 minutes

Purpose: This debriefing should cover the scope of the first session including the last exercise.

1) The facilitator must carefully draw out of the group a more abstract definition of a database. One can use any accumulation of information (a desk top full of bills, check stubs, etc.) to demonstrate a collection of data. The ordering of that data according to some consistent pattern (like a filing system or dictionary) is the key to understanding a database. Recognizing consistent patterns in the data allows the data to be retrieved and sorted according to the user's needs. Depending on the sophistication of the group, some of the participants may come up with some elaborate uses for databases. It is important that the entire group have a basic understanding of databases. The facilitator should be sure they understand the concept.

2) Ask the teachers to think about how to apply what they have learned to the classroom. Encourage them to discuss the sessions with their colleagues. Emphasize the importance of communication with their principals about the sessions. Ask them to think about what they have learned and how it fits into the school as a whole.

   Some possible questions are:
   a) What did you enjoy most about today's session?
   b) What one idea will you take back to your school and try?
   c) What will you share with a student or colleague?
   (Computer or non-computer activity?)
   d) What did you gain from working in groups?
      I) How do you set up groups when you use computers with students?
      II) What group management techniques work best in your classroom?
   f) Off-computer activities are as important as on-computer activities. Are there things we did on computer that can be extended to off-computer activities? Are there any off-computer activities that we did today that might prove useful in your classroom?
   g) What things have we done that require specific knowledge of computers and what things depend more on general knowledge about teaching in general or social studies in particular?

3) Provide a general review and discussion of the format of the sessions. Explain the sequence of future sessions (Handout course syllabus).
   a) There will be a problem solving theme in all the sessions. Each of the session will examine aspects of problems in the context of that days activities. There will be substantial and continuing emphasis on problem solving and critical thinking, and on use of computers in the social studies curriculum.
   b) The bibliography of all the readings during each session as well as other readings on social studies issues can be handed out at this time.
   c) The major project (see handout) should be discussed to insure that all the participants understand that the project should be a personal statement about computer uses in their professional lives.
   d) The game of the week can be handed out and the purpose of this homework exercise should be discussed.
   e) Pass out the FrEdWriter disk and the directions (see Handouts in this section). This is a public domain piece of software that the participants can use to do their word processing.
   f) Any other material, such as the software bibliography can be given to the participants.

Logs: Logs are to be filled out each week.

1) The logs will help heighten the participants' awareness of their own computer related activities.
2) Typically log entries will include:
    a) software used or previewed
    b) computer associated activities
    c) computer related information that was shared with others
    d) any ideas about computers in education
    e) general observations about educational use of computers
    f) questions about computers in education or the project.

Closure:
5 minutes

1) Ask participants to reflect on this session's activities.
2) Be positive about their contributions, and highlight their experience and expertise as classroom educators.
3) Review next week's activities.
4) This is a good time to set up the procedures for handing in weekly logs and Game of the Week exercises.

Think Ahead: Remind participants and/or ask:

1) Remember to fill out the logs daily.
2) Remember the game of the week!
3) Who provides refreshments for the next session?
4) If the meeting place is different, be sure everyone knows the location.
5) Bring name tags for each session.
6) Check the course registration material for correctness.

Evaluation Indicators:

Did they have fun?
Did they find one idea to take back with them? (It could be a non-computer activity.)
Did they work in groups?
How did the demonstrations go?
Was the desired behavior modeled?
How did the non-computer activities go?
Did you vary the auditory, visual and kinesthetic input?
Did you give them respect for the valuable skills and knowledge they brought with them to the computer?

4.1.3 Timeline

This is a sample timeline for the first inservice session based on the Script in 4.1.2. The Bank Street School Filer has been booted on each computer system and the tutorial menu screen is on the monitor. PA-1 is on top of each students binder which is next to the computer.

0:00 - 0:20	**Initial activity:** Using the Banks Street School Filer the participants begin to use a database and the management system associated with the database. Immediate involvement - no introductions, everything begins on time with a hands on activity. Participants work in pairs and follow the instructions written on the performance aid.
0:20 - 0:25	**Discussion**: This discussion will pull the focus away from the computer to the facilitator. This method of starting will be the modus operandi throughout the inservice series.
0:25 - 0:50	**Introductions**: The introductions will serve to introduce both the facilitators and inservice participants including any school administrators. Overall presentation on -CI^3 model -problem solving theme -etc.
0:50 - 1:00	**Break:** It is good to take a break immediately after the introductions. It gives the participants the opportunity to socialize.
1:00 - 1:20	**Activity:** This activity is an extension of the first activity in that it continues to expose the participants to various characteristics of a database and the management system that allows them to manipulate the data.
1:20 - 1:40	**Debriefing:** This debriefing will cover the scope of the session. The facilitator will draw out definitions of databases and get the participants to comment on how the computer can be used in an educational setting. Secondly, the next seven sessions will be characterized, and a discussion will center around the teachers applying what they have learned.
1:40 - 2:00	**Closure:** This last time block will be used to discuss the overall inservice project, log sheets, this week's assignment, and logistical details such as class registration and parking permits.

4.1.4 Handouts

The pages of this section are handout materials needed by the participants during Session 1 of the Social Studies Inservice. These materials are used by the participants as performance aids, course reference material, and as weekly assignment material during the next seven inservice sessions. The facilitator may find it useful to make some of these into overhead projector foils for use during the inservice. Note that part of section 4.1.5 may also include resources that can be used by the participants.

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Outline of Eight-Session Inservice Series

Session 1: What Are Databases?

In the first half of this session, we will use a tutorial that will introduce some of the basic features of the **Bank Street School Filer.** The last half of the session will be devoted to having participants and staff get acquainted as well as outlining the nature of the term project and other general concerns of the next seven weeks. Note that in 1988 Bank Street published a Bank Street School Filer workshop manual. It contains substantial material that would be useful in the first few sessions.

Session 2: Database Management System

During this session we will continue to explore the educational uses of databases using **Bank Street School Filer** and **United States Data Base.** The emphasis will be on examining the uses of databases in developing higher order thinking and critical thinking skills.

Session 3: Make Your Own Database

Using **Bank Street School Filer**, we will explore how to develop our own databases. We will discuss some of the possible on-computer and off-computer educational benefits in developing our own databases. We will conclude this session by discussing and analyzing some of the major ideas covered in the previous sessions.

Session 4: Introduction to Computer Simulations

We will examine the use of simulations in the classroom. Using **President Elect** as one example of a simulation, we will explore the presidential election campaign. The deeper questions concern -ing computer simulations and their educational uses will be examined.

Session 5: Another Simulation

This session will examine how a simulation can be used to teach problem solving and critical thinking skills and enhance the transfer of learning. The focus will be on the way simulations can be used to develop communication skills and decision-making abilities.

Session 6: Teacher Productivity Tools

We will use utility programs such as a computerized gradebook, *Timeliner*, and perhaps other pieces of software as we examine the role of utility and other teacher productivity programs in education. The emphasis will be on types of software that teachers use in preparing lessons, keeping records, retrieving information for their own use, etc.

Session 7: Graphing to Represent Data

During this session we will look at using the computer to graphically represent quantitative data in the social studies. Using **MECC Graph** and/or **Easy Graph II** we will explore using graphs to represent quantitative information by bar, line, circle, and pictographs. As in the earlier sessions, problem solving will be a central theme in this session.

Session 8: Problem Solving, Telecommunications, and Closure

How can computers be used to help teachers develop their students' thinking skills? What are some important computers issues in social studies education? These questions and others will be examined along with a brief look at telecommunication systems.

Additional Sessions

The materials in this National Science Foundation project Notebook were specifically designed to fit an inservice series of eight two-hour sessions. However, the eight scripts outline somewhat more material than can comfortably be covered during this number of sessions. A number of the topics could be expanded. In addition, each inservice participant was asked to do a project. These projects could be used as the basis for one or more sessions at the end of the series.

Thus, with relatively little effort, the materials given here could be expanded to be equivalent to a two semester hour college course for educators. Remember the rule of thumb for courses that carry graduate credit. A one semester hour course needs to have approximately 15 contact hours and approximately 30 hours of outside of class assignments.

CI^3 Social Studies Performance Aid # 1

Introduction

This is an example of a Performance Aid—a participant's instruction sheet. It is a detailed set of directions for accomplishing a specific task with a particular piece of software.

Note 1: It is assumed that the workshop facilitator has loaded the database tutorial into the microcomputer. The machine is turned on and ready to go.

Please do not write on any of the material in the vendor's binder. This software will be used by others. You may write on any of the instruction sheets or other handouts. If you have any questions, ask one of the assistants in the room.

Exercise # 1

1. The computer has been set up for you. On the screen is a tutorial that will tell you some things about the **Bank Street School Filer** database program. Begin the tutorial with Lesson 1: Introduction. At the completion of Lesson 1, continue in sequence with the rest of the lessons in the tutorial. Follow the directions very carefully. You will notice that you are being exposed to quite a list of "commands" that the computer system knows how to perform. You may find it helpful to write these down. This list will contain all the commands you encounter while working with this program (software).

   Each computer software system that you use will have its on peculiarities and its own detailed sets of commands. If you use a particular system enough, you will eventually memorize the commands that you use most frequently. Contrast this with a style of instruction in which you are first asked to memorize the commands, and then you are allowed to begin using them on the computer.

2. If time permits take the **Bank Street School Filer** binder, turn to page 1, and read the Introduction. The introduction will provide a good overview of a typical database system package.

CI^3 Social Studies Performance Aid # 2

Please do not write on any of the material in the vendor's binder. This software will be used by others. You may write on [illegible] instruction sheets or other handouts. If you have any questions, ask one of the assista[illegible] room.

1. The computer has been set up for you and is ready for your entries. Beside your computer is the Sunburst binder called **BANK STREET SCHOOL FILER**. Turn to the section called **TEACHER TUTORIAL** on page 8. In the section called **Retrieving a File**, you will do only steps 2, 3, 4, and 5. When following directions such as these, it is *good practice to read several steps ahead but to do the directions in the order that they are given*. For example, read steps 2 through 5 to get an overview and then return to step 2 and begin executing each step in sequence. (If you are in doubt, ask an assistant or explore—you cannot hurt the machine or the data.)
2. Continue with the sections called **Browsing**, **Updating Records**, **Adding a New Record,** and **Saving Your Changes.**
3. When you are finished with the **Saving Your Changes** section, turn the page in the binder and continue with the second step in **Finding Records**, but ignore step 11 in this section.
4. Continue with **Sorting Records**. We encourage you to have fun and experiment with different sorting parameters. Remember, the entire array of commands can be seen at a glance by pressing the OpenApple, Shift and ? keys simultaneously.
5. Remove the disks from the drives and place them in the empty jackets, which should be on top of the disk drive, and set them back in the empty slots in the back of the **BANK STREET SCHOOL FILER** binder . Turn off the computer using the button at the back of the case (on the left hand side). Turn off the monitor (the button in the upper right-hand corner).

QUICK START READY REFERENCE GUIDE TO *FrEdWriter*: GETTING STARTING

Note: This material is from FrEdWriter Documentation DOC.A.

BASICS

FrEdWriter is a very easy Word Processor to learn. You must know four things when you are writing with *FrEdWriter*:

1. Most of the keys on the keyboard will make letters on the screen.
2. Press the **DELETE** key to erase mistakes.
3. Press the **ARROW** keys to move the cursor around the text.
4. Press **Control-T** to see the <T>utor which tells you more about *FrEdWriter* commands.

TYPING *FrEdWriter* COMMANDS:

FrEdWriter commands look like this: <P>rint.
They are typed this way:

1. **PRESS** the **CONTROL** (or CTRL) **KEY** at the left side of your keyboard.
2. **KEEP** it down while you **STRIKE** the letter inside the < >.

LOADING DOCUMENTATION

The *FrEdWriter* disk contains complete documentation, written by June Wedesweiler Dodge of San Diego CUE. It is contained in four text files called: DOC.A, DOC.B, DOC.C and DOC.D. You can use *FrEdWriter* to load, read, and print them.

Here's how you **load** DOC.A when you are in *FrEdWriter*:

1. Type the <**N**>ew command (**Control-N**). At the prompt located at the bottom of the screen, type '**Y**' and press **RETURN**.
2. If you are using a 40-column screen (large type), type the <**W**>idth command (**Control-W**). At the prompt located at the bottom of the screen, type '65' and press **RETURN**. (The right side of the text will be invisible at first. Use the Right-Arrow to see it all.)
3. Type the <**L**>oad command (**Control-L**). At the prompt at the bottom of the screen, type 'DOC.A' and press RETURN.

PRINTING DOCUMENTATION

1. Load DOC.A as described in LOADING DOCUMENTATION above.
2. Type the **<P>**rint command (**Control-P**), press **RETURN**.
3. Tap the **ARROW** key until you highlight TOP LINE, press **RETURN**.
   Type '***** FrEdWriter Documentation DOC.A Page # *****'
   and press **RETURN**.
4. Check to be sure the printer is on; then press **RETURN**.
5. When printing is done, repeat for DOC.B, DOC.C, DOC.D.

QUICK START READY REFERENCE GUIDE TO *FrEdWriter*: COMMANDS

Here is a complete list of *FrEdWriter* Commands. This same list is also in the <T>utor inside *FrEdWriter*. Details about each command are found in the reference to the right.

Apple II, II Plus, IIe and IIc	**REFERENCE IN DOCUMENTATION**
<T> = SHOW THIS TUTOR	DOC.C-2
<P> = PRINT this document	DOC.D
<S> = SAVE from memory to disk	DOC.B-3
<L> = LOAD from disk to memory	DOC.B-2
<F> = FIND and replace words	DOC.C-8
<W> = Change page WIDTH	DOC.D-3
<C> = Use with arrows to CHANGE CASE	DOC.C-12
<R> = REVEAL/Hide Paragraph Markers	DOC.C-4
<B> = Jump to text BEGINNING	DOC.C-3
<E> = Jump to text END	DOC.C-3
<N> = New Page (erase memory)	DOC.B-2
<Q> = QUIT FrEdWriter (Return to Menu)	DOC.C-12
<V> = Accept Control Keys as Letters	DOC.D-0
ESC = Change the page top line	

Additional *FrEdWriter* Quick-Reference Comments

Apple IIe and IIc	**Apple II and II Plus**
Left/Right-arrows	Left/Right-arrows
Up-arrow (line)	Control-A
Open-Apple-Up-arrow (paragraph)	Shift-Control-A
Down-arrow (line)	Control-Z
Open-Apple-Down-arrow (paragraph)	Shift-Control-Z
DELETE key (erase letter)	Control-D
Open-Apple-Delete (erase line)	Shift-Control-D
TAB key (5 spaces)	Control-I
CAPS LOCK key	Shift-ESC
Open-Apple Left/Right-arrows (block move)	Shift-Control-arrows
Open-Apple-P (Prompt Box Mode)	Shift-Control-P
Open-Apple-A (top line)	Shift-Control-S
Open-Apple-Z (bottom line)	Shift-Control-X
Open-Apple-R (removes prompts)	Shift-Control-R
Open-Apple (pauses scroll through prompt box)	Shift

Game of the Week (Session 1)

Get two tests you have used with your students (preferably one teacher-made and one published test) and examine the questions on the two tests. Check to see which questions on the tests could be answered by using items found in a database and which questions require more thinking. The idea is to begin to think about lower-order versus higher-order skills. The human mind is reasonably good at memorizing a lot of facts. But this takes a lot of time, and the human mind is also quite good at forgetting. The growing use of computerized databases for information storage and retrieval has the potential to make a significant difference in how social studies is taught and how student progress in learning the field is measured.

Fill in the chart below and *provide one example* for each category of question. (A total of four examples.)

Total number of questions on the teacher constructed test _______.

Number of questions that could be answered using a database _______.

Percent of total: _______.

Sample Question: What continent is Italy on?

Number of questions requiring more involved thinking skills _______.

Percent of total: _______.

Sample Question: What is the main difference between relevant and irrelevant information? Given the short editorial from the Eugene Register Guard, identify the relevant and irrelevant information. Justify your answer.

Total number of questions on the publisher's test _______.

Number of questions that could be answered using a database _______.

Percent of total: _______.

Number of questions requiring more involved thinking skills _______.

Percent of total: _______.

(If you use only teacher constructed tests or only publishers' tests, include data for the test in the appropriate category and ignore the other category.)

Game of the Week Outcomes (Session 1)

Note: This is not intended as a handout. Rather, it is a brief discussion to give the inservice facilitator some ideas on what outcomes may be expected from the Game of the Week.

Results: Those teachers who used a teacher constructed test to examine which questions on the test could be answered by using items found in a database and which questions require more thinking, report that out of 443 questions examined, 63% could be answered using a database and 37% of the questions required more involved thinking skills.

Those that periodically use a publisher's test report that out of 316 questions examined, 73% could be answered using a database and 27% involved more thinking skills.

These results are consistent with the general view held by most educators that more emphasis is placed on lower order thinking skills than higher order thinking skills. Benjamin Bloom indicates that 95-percent of the questions on teacher-made tests focus on lower order skills.

The inservice facilitator should be aware that this emphasis on lower order skills occurs across the curriculum in all disciplines. In math instruction, for example, it is estimated that at least 75% of the time is spent in routine drill, working to have students learn to do things that a calculator or computer can do.

Term Project: NSF Social Studies Inservice

Write a position paper that addresses the changes that need to be made in social studies education in order to prepare today's students for the information age.

What things can **you** do **now** to prepare your students for living in an information-rich world? What things might **you** do in the future? What equipment, facilities, or training would be needed to realize your plans. I want to read about **your** position; make it personal, and make it specific.

This paper should be done on a word processor (or, if all else fails, a typewriter) and should be approximately eight to ten pages long. A page is approximately 1600 key strokes. The paper is due at the end of the seventh session.

CI^3 Participant Log

Name: ________________ Date: ________

Please use this form to record **all** of your computer related activities, both at school and at home, during the seven-day week beginning immediately at the end of this inservice session.

Note to inservice facilitator: You may want to customize this form to fit the specific dates of your inservice, labeling the days of the week. Provide participants with one log sheet for each week of the inservice series.

Day 1

Day 2

Day 3

Day 4

Day 5

Day 6

Day 7

Additional Comments and Questions

4.1.5 Materials

This section of the Notebook is a place holder for handout materials specifically designed for use by the students of the inservice participants. Sample lesson plans might also be included.

The support materials for the Bank Street School Filer are extensive. They include well-conceived activities that can be done with the inservice participants. The examples are rather detailed and can be adapted to a variety of instructional settings. Because the support materials are so extensive, the developers of this Notebook felt that it was not necessary to include additional materials in this particular section.

In 1988 a Bank Street Filer workshop manual was published by Bank Street. It includes handouts, transparencies, and sample files useful in conducting inservices. Inservice facilitators will want to make use of some of these publisher supplied materials during the inservice session. If the session is more than two hours in length, it is appropriate to have participants work through a number of the student activities.

The National Council for Social Studies has published materials stating goals and objectives for social studies education. These materials place substantial emphasis on information skills. They would make good handouts for this phase of the inservice.

4.1.6 Readings

The "Readings" sections of this Notebook are designed to supplement the materials presented during the inservice sessions. It is appropriate to assign these readings as "homework." The inservice facilitator may want to browse the recent issues of *The Computing Teacher* and other popular periodicals aimed at computer education leaders for suitable handout materials.

One goal in an inservice such as this is to get participants more used to reading the literature pertaining to their teaching area. *The Computing Teacher*, *Social Education*, and *The Social Studies* are three such magazines/journals that include information such as computer-oriented articles, book reviews, and software reviews that is useful to the social studies educator. There are a number of other periodicals available that include suitable reading material for the inservice. We have included an article on higher order/lower order thinking skills that may useful to share with your participants and a bibliography of some pertinent articles you may want to examine for possible inclusion in your sessions.

Lower-Order and Higher-Order Skills

Dave Moursund

(From EDITOR'S MESSAGE in *The Computing Teacher*, February 1987.)

I begin one of my favorite workshop activities by discussing the idea of effective procedure—that is, the types of procedures that computers can carry out—and how this relates to problem solving. I then ask the workshop participants to identify disciplines that seem to have a relatively high or relatively low concentration of effective procedures. Mathematics is usually the unanimous choice for the discipline with the highest concentration of effective procedures, although the physical sciences sometimes run a close second.

The fun begins as workshop participants start to name disciplines with relatively low concentrations of effective procedures. Art is frequently mentioned, but I then suggest that the graphic or commercial arts seem to make major use of computers. Sometimes the social sciences are mentioned. But then some workshop participant will give a solid argument that the organization, storage, retrieval and presentation of information is greatly helped by computers.

Eventually a pattern emerges. Each discipline has some parts where computers are very useful and other parts where computers are of modest or no use. Even math fits this pattern. Math is viewed by many mathematicians as an art form, as a field requiring a great deal of creativity, and as a field where computers are mostly useful in carrying out routine computational or manipulative tasks.

Skills for Problem Solving

Within each academic discipline there is a continuum of knowledge and skills. Bloom's taxonomy is a division of this continuum into (1) knowledge, (2) comprehension, (3) application, (4) analysis, (5) synthesis and (6) evaluation. Many educators refer to the first three as lower-order skills and the latter three as higher-order skills.

It seems evident that problem solving requires both lower-order and higher-order skills. For example, suppose one is faced by the problem of writing a descriptive narrative using pencil and paper. Then spelling, grammar and penmanship are lower order skills that will enter into the final product. But no matter how well these lower-order skills are used, the writing may turn out to be very poor. Good writing has style; it has appropriate and rich use of vocabulary; it communicates clearly. The production of good writing requires use of such higher order skills as information retrieval, organization, drawing on a rich vocabulary, understanding the intended audience and the purpose of the writing, revision, and so on.

The problems in each academic discipline can be analyzed in this same way. In arithmetic one has many lower order skills, such as writing the numerals, counting, and performing the four basic arithmetic operations. One also has higher order skills, such as representing real-world problems as arithmetic computations, applying problem-solving techniques such as breaking a big problem into more manageable pieces, estimating, detecting computational errors, and interpreting computational results in light of a real-world problem that one is working to solve.

Educators have long understood the dichotomy of lower-order versus higher-order skills, and each curriculum reflects a balance between them. But even within the school systems of a single state there may be major differences in emphasis on higher-order and lower-order skills. In some schools the balance is heavily weighted toward lower-order skills (rote memorization is stressed), while in other schools there is more emphasis on analysis, synthesis and evaluation.

The balance between lower-order and higher-order skills can change in an educational system over a period of years. Education in the United States began a "back to basics" movement more than 15 years ago. This movement included increased emphasis not only on reading, writing and arithmetic, but also on the basic skills in these and other disciplines. Now many educational leaders in the United States are arguing that the back to basics movement was a mistake and that we should be placing much greater emphasis on higher order skills.

One argument for increased emphasis on higher-order skills is based on an examination of the steady decline in college entrance exam scores that extended over many years and just recently appears to have bottomed out. An analysis of such test scores indicates that the basic skills component of these scores actually increased. It was the higher-order skills that declined drastically and dragged down the total scores.

A second argument should be made by computer education leaders. Most of the effective procedures that computers can carry out fail in the lower order skills area. For example, in writing one can use a word processor (as contrasted with penmanship) and one can use both spelling and grammar checkers. In arithmetic one can use a calculator. The argument is that appropriate use of computers can be a partial substitute for some lower order skills.

To me the argument seems clear. A good education must be balanced between lower-order and higher-order skills. Computers have a greater impact on lower-order skills than on higher-order skills. For example, in a wide variety of disciplines, computers make it more appropriate to retrieve information than memorize it. Computers can carry out routine manipulative tasks that require substantial schooling for humans to learn to perform. Thus, some of the time currently being spent on lower-order skills can be replaced by a combination of appropriate use of computers and more time spent on higher-order skills.

In several recent workshops I have raised the idea that we might replace much of the cursive writing penmanship curriculum by keyboarding. (This idea was suggested to me by my colleague Keith Wetzel.) While there is an initial round of outright shock and laughter, the majority of participants in my workshop support such an idea! The next time you want to provoke an argument with traditional educators, you might suggest that penmanship is of rapidly declining importance. When the argument begins to wane, suggest that everyday voice input to computers is now visible on the horizon.

There are many things that people can do better than computers—especially if they have an education that emphasizes higher order knowledge and skills. An appropriate education for the Information Age must take into consideration the capabilities of computers and prepare people to work with computers, rather than compete with them. All computer educators should encourage a greater emphasis on higher-order skills.

Bibliography

Below is a bibliography that lists a few articles that can be also used as reading material for the first several inservice session. Not all the articles may suit your needs as an inservice provider, but they have been taken from commonly available sources and most social studies educators have access to one or more the magazines listed in this bibliography. In the reading section of the third session there is an annotated bibliography that touches upon the content of some of these articles.

Bailey, S. (1987, January/February). Using the computer in middle school studies. *The Social Studies, 78*, 23-25.

Berg, R. (1983, May). Resisting change: What the literature says about computers in the social studies classroom. *Social Education, 47*, 314-316.

Cohen, M.L. (1983, March). NCSS looks at the computer revolution. *Social Education, 47* 186-188.

Hunter, B. (1987, January). Knowledge-creative learning with data bases. *Social Education, 51*, 38-43.

Lengel, J.G. (1987, January/February). Thinking skills, social studies, and computers. *The Social Studies, 78*, 13-16.

Lengel, J.G. (1987, January). Developmental stages in school computer use: Neither Marx nor Piaget. *Social Education, 51*, 52-53.

Rockman, S. (1986, Spring). If not now, when? The rationale for technology in the history/social science classroom. *Social Studies Review, 25*, 30-34.

Rosenzweig, L. (1985, April). Teaming up social studies and computer teachers. *Electronic Learning, 4* (7), 16, 21.

Searles, J.E. (1963, May). Information technology and the social studies. *Social Education, 47*, 335-337.

4.2

SESSION 2: Database Management System

4.2.1 Narrative Overview

Training Versus Education

A computer is a tool explicitly designed to aid in the storage, manipulation or processing, and retrieval of information in order to help people solve problems. The computer field is sometimes called the information processing or data processing field. There are a wide range of ways to educate and train people to learn to use the computer tool. At one end of the scale is pure computer and information science. This is a highly theoretical program of study that focuses on systems analysis, problem solving, programming, and the underlying theories that support research and development in this field. Perhaps the other end of the scale is specific training in using specific computer applications, such as a word processor or a database.

In these inservices we take a position between the formal, theoretical computer science education, and the pure training on use of applications. We want teachers and their students to be **educated**, as distinguished from being **trained**, in use of some computer applications that are particularly relevant to social studies education.

To cite a specific example, it is relatively easy to train a person in the use of a word processor The focus is on what key strokes are needed to accomplish various tasks. How does one select a paragraph, in order to move it to a different location? How does one change the font, cause text to be underlined, or change a margin. Contrast this with process writing, where the emphasis is on prewriting, composing, conferencing, revision, and publication. In process writing the emphasis is on producing better quality writing. There is a substantial body of research underlying and supporting the teaching of process writing.

The message should be clear. It is not enough to train a teacher in the use of a specific computer application. It is also necessary to educate the teacher in how the computer application is to be used in the teaching/learning environment. An inservice that focuses only on the training aspects of a computer application will not produce significant change in the typical teacher's classroom behavior. There must also be a strong emphasis on the theory underlying the application and how the application is to be used.

The theory on transfer of learning is also strongly supportive of teaching general ideas rather than just focusing on specific details. To a large extent, all word processors are alike. A person learning to use a word processor should be learning how all are alike, rather than memorizing all details of one specific word processor.

Processing Information

Databases, spreadsheets, and word processors are all software tools that allow the user to organize, manipulate, store, and retrieve information. Being able to quickly access and easily manipulate the data and present it in new ways is one of the strengths of computerized data. It is instructive to contrast this with more concrete representations of information storage and manipulation, like typewriters, dictionaries, and photocopies of documents. A database and data management system allow students to practice the skills of ordering, sorting, searching and interpreting information. These are important problem solving skills.

Unfortunately, the experimental research on the uses of the computer to assist in developing information processing skills is very small. The business sector has for the last several years used computers to manage and process information central to their activities. Educators have also used such systems administratively. Classroom teachers inside and outside the classroom are using data processing systems like databases. But research studies are just beginning look at how the use of computerized databases help develop problem solving skills.

The general nature of the research is to determine how a computer can aid in solving social studies problems. We have previously discussed the issue of memorization versus learning to do information retrieval. Since computers make information retrieval faster and easier, they change the balance point between what should be memorized and what should be looked up.

Another example is provided by how one represents social science data. How does the mind deal with an extensive table of data versus the same data represented in a graphical or chart format? For example, consider a table of data giving the population of each state in the United States and the percentages of a state's population falling into different income categories. Perhaps the table is arranged alphabetically. Contrast this with a map of the United States with the states given different colorings or shadings to reflect the different income average categories. In the latter case the human mind may detect patterns in a single glance that would be very hard to discover by examining the table.

The goal of information processing is to *supply data for decision making*! The research on inquiry and cooperative learning strongly support the notion of creating interactive environment in which students are directly involved in the learning process. Databases allows students to actively sort and search information to find relationships and test hypothesis and form generalizations based upon the data. Further they can identify correlations, examine cause and effects, and compare and contrast information. This ability to electronically manipulate data gives the learner ample opportunity to become involved in the learning process and apply decision making skills.

This second session focuses on just such activities. It requires the participants to critically examine their experiences using a database. The goal is to have them experience using a database to classify a variety of data and to make explicit how these activities can be transferred to the classroom. As before, an emphasis will be on analysis skills involved in problem solving. Remember, learning the mechanics of using a database is quite easy; learning to think and solve problems using a database is much more difficult.

4.2.2 Script

Theme

Using databases to solve problems

Objectives

1. Computer use objective is to familiarize the participants with general computer protocol.
2. Instructional objectives are:
   a. Let the participants experience using a database as a way to classify a variety of data.
   b. Using the database management system, understand how to retrieve various types of information.
   c. Make explicit (by using a consultative format) how their experiences can be transferred to classroom.

Abbreviations

Readers of this script and subsequent scripts should note that the following abbreviations are used.

LP—Lesson Plan
PA—Participant's Instructions
HO—Handout
OV—Overhead projector

Materials

Software
Sunburst Communications:
Bank Street School Filer
North America Database Disk
United States Database Disk
(a class set)

Handouts
PA1
PA2
LP 1-Data Bases
LP 2-Data Bases

Names and schools of all the participants.
Weekly Logs
Game of the Week
Readings

Refreshments

The school site where we are meeting is responsible for refreshments. Be sure that liquid refreshments are available by the time that participants arrive.

Assumption

Participants have had some exposure to a computer and databases; however, in the first session so many different activities were introduced that more time needs to be spent on the management system and the commands used to sort/search the data.

Pre-Session

1. Place the *Bank Street School Filer*, *North American Database Disk*, and *United States Database Disk* beside the computer.
2. The computer, including the monitor is turned on and the program has been booted and the file Students is already loaded into the system.

3. Have a the first set of performance aids placed beside the computer (one for each participant).

Get Started
35 minutes

Purpose: Immediate involvement, no time wasting, everything begins on time with a hands-on activity.

Participants work in pairs and follow instructions written on the performance aid. The first exercise is intended to review the various commands that they encountered in the previous session. Using the Students file on the School Database Disk, various commands are reviewed and practiced. Participants who have not had much experience with use of computers and databases will use the full 35 minutes to review. For others, a much shorter period of time is necessary and they will proceed to other sections in the manual. The performance aid has been structured to allow for these individual differences and participants should be encouraged to proceed at their own pace. During the debriefing it should become clear that a database is a way of organizing, storing, and retrieving information.Being able to quickly access and sort/search the computerized data should be contrasted with accessing and using a more concrete database like a dictionary or almanac.

Transition
1 - 2 minutes

Pull the focus away from the computer to the presenter. Note that the computer protocol handout is for their reference and will help in next week's activities when they will be asked to start the systems from the beginning by inserting the disks and turning on the computer and monitor.

Debrief
12 - 14 minutes

Discuss the commands and how they are used. Follow the list of questions below. Try to involve as many participants as possible during the debriefing. Maintain an open and uncritical atmosphere .

-Were the instructions clear?
-Were the directions in the software manual clear?
-Can someone verbalize how to use the sort command?
-etc.

Cover the conceptual difference between a electronic database and static database such as a telephone book.

-What is a database?
-Is a telephone book a database? An almanac? An encyclopedia?
-How could one characterize an electronic database?
-What does an electronic database management system allow you to do?

Break
10 minutes

Refreshments Note: Remind everyone that we will start again in ten minutes.

Set up

Place PA 2 (one for each participant) for the second activity on top of the Bank Street Writer binder. Hand out this weeks notebook material (readings, etc).

Activity:
35 minutes

Purpose: This activity is an extension of the first activity in that it continues to expose the participant to the characteristics of a database. It (See Discussion) places a particular emphasis on being able to use the sort/search commands with a number of exercises that explore some practical examples. In order to do these exercises one must know how to use the sort and search commands. During the debriefing, emphasize on the sort/search commands and the tremendous power they bring to the learning processes. Secondly, discuss how these activities be used by the teacher and with the students. The last part of the debriefing session should look at the accuracy of database information and an initial query into how to generate database material.

Discussion

When the participants return from the break, tell them to begin the next activity by following the directions on the sheet placed next to their computers.

Debrief
20 minutes

Debrief the above activity. Keep the focus on the search/sort commands and what students can do with these capabilities. The last question in the list below allows entry into the next session's activities.

- What do the sort/search commands bring to the educational setting not brought by other media such as encyclopedias?
- What types of educational gains can be obtained by using an electronic database?
- What type of materials could be used to support an electronic database?
- What types of information is good to use in a database?
- Who determines the accuracy of database information?
- What types of data could be used by the students to make their own databases?

Closure
5 minutes

1. Ask them to reflect on this session's activities.
2. Be positive about their contributions, and highlight their experience and expertise as classroom educators.
3. Review next week's activities.

This Weeks Assignment

See Game of the Week
1. Have them turn in last weeks Game of the Week.
2. Discuss the Game of the Week if needed.

Logs

Logs are to be filled out each week.
1. The logs should be turned in.
2. New weekly logs should be handed out.

Think Ahead

Remind everyone:
1. Remember to fill out the logs daily.
2. Where we will meet next week.

4.2.3 Timeline

Make sure that the computers are set up with the Bank Street School Filer disk. Place the binders and the performance aid next to each computer.

0:00 - 0:35	**Initial activity:** This activity gives the participants a chance to reexamine a database and the various operations that can be performed on a database. Participants work in pairs and follow the instructions written on the performance aid.
0:35 - 0:37	**Discussion**: This discussion will pull the focus away from the computer to the facilitator. Make note of the computer protocol sheet.
0:37 - 0:50	**Debrief**: Review - Discuss the computer management system and the most useful commands. Cover the difference between an electronic database and databases like dictionary. Each has certain advantages and certain disadvantages.
0:50 - 1:00	**Break**
1:00 - 1:35	**Activity:** This activity is an extension of the first activity in that it continues to expose the participants to various characteristics of a database. Particular emphasis should be placed on the sort/search commands.
1:35 - 1:55	**Debriefing:** Be sure to cover the more important commands and emphasize the strength that search and sort options can add to an educational setting. Look at how databases can be structured, who determines what type of information goes into a database, and who has responsibility for its accuracy. Finish the session with ideas about what types of databases students could use or make.
1:55 - 2:00	**Closure:** Ensure that all homework material is turned in and new materials have been received by everyone. Close with a statement about next weeks activities.

4.2.4 Handouts

The pages of this section are handout materials needed by the participants during Session 2 of the Social Studies Inservice. These materials are used by the participants as performance aids, course reference material, and as weekly assignment material. The facilitator may find it useful to make some of these into overhead projector foils for use during the inservice.

Index to Handouts	Page
(PA) CI^3 Social Studies Handout # 1: Week # 2	2
(PA) CI^3 Social Studies Handout # 2: Week # 2	3
Game of the Week: Session # 2	4
Results of the Game of the Week: Session # 2	5

CI^3 Social Studies Handout # 1: Week # 2

1. This first exercise will provide the opportunity for a review of the new terms and keyboard entries and their associated functions (commands) that we looked at last week. Turn to page 9 in the section called **TEACHER TUTORIAL** in the **BANK STREET SCHOOL FILER** binder. *The computer has been set up for your entries and the STUDENTS file has been retrieved for you.*

2. Because you have previously looked at LESSON 1: The Basics, you may either skim the information in this section or by using the computer, quickly go through the exercises. If you choose to use the computer to go back through the entire lesson, then begin at the Browsing section (at the top of page 9).

3. The sections on Finding and Sorting are important, so be sure you enter commands at the keyboard and go back through the exercises in these sections. Start with step # 2 on page 12. Also, the name Brian Orshak may have been altered in your file, so you should use the Browse function and either check the file or choose another name in the file to find. [Remember: skip step 11 in the Finding Records section].

4. After you have finished the Sorting Records section, press RETURN to go to the Main menu. Use the arrow key to highlight Retrieve, if it is not already highlighted, and then press RETURN again. The system will ask if you want to clear the data. Type Y.

5. The system will ask if you want a CATALOG (display of the names of databases on disk). Type Y for yes, and the system will load in and display on the screen a list of the databases on your data disk.

6. The databases cover a variety of subjects. Choose one that interests you, type the name exactly as shown, and press RETURN. Do not enter a password. Press RETURN.

7. Look at the various fields on the screen. Browse through the database. If after browsing you find little of interest, then choose another subject. If you want to access another subject, go to the Retrieve option and go back through the sequence. The system will ask if you want to clear the data. Type Y. The sequence will ask if you want a CATALOG. Type Y .

8. After settling upon an area of interest, browse through and examine the data. After you are familiar with the records try to find two relationships (involving analysis, synthesis or evaluation) that you did not already know about the subject. This will require you to use both Find and Sort. Write down the your observations and be prepared to share them with the class. Remember you are encouraged to explore and have fun. You cannot hurt the system from the keyboard.

9. If time permits, choose another subject and do the same thing.

CI^3 Social Studies Handout # 2: Week # 2

1. Turn to the section **Getting Started** in the **NORTH AMERICAN DATABASE DISK** binder.
2. The ATLAS file has already been loaded into the computer.
3. Finish steps 3 and 4 in this section. At step 5 choose two areas of interest and pursue them.

Game of the Week: Session # 2

Think about the processes that you students must go through when they write a research-based report. They may have to use a dictionary, an encyclopedia, a card catalog, and a number of other sources just to get the information. Other skills are required to select out the right type of information to put in the report, and to actually write the report. Remember, finding information is part of the overall process of doing a research-based report. The student must decide what information to look for, when enough information has been found, how to organize the information, and so on.

Using a computer database requires a set of skills that is somewhat different than those needed to access information by hand. If you knew your students had easy access to a variety of computer databases (and would have easy access to databases for the rest of their lives) how would this change your approach to teaching the research skills necessary to do a report on some subject?

To answer this question, select one social studies class you teach and identify it by grade level and course title. Suppose that you were going to explain the capabilities and limitations of computerized databases to these students. Write three paragraphs outlining the following key ideas that might be covered in your explanation to your students.

1. Capabilities and advantages of a computer system.
2. Limitations and disadvantages of a computer system.
3. How using a computer database system is similar to and different from using by-hand systems to retrieve information.

Note: We encourage you to try out your ideas with a class. If you do, please include in your write-up how you and your class felt about the presentation.

Results of the Game of the Week: Session # 2

In answering the first part of the game of the week most of the participants addressed the ease with which information can be manipulated by sorting and the ease with which information can be found using searches. Other comments by the participants centered around the rapid access speed, the increase in the amounts of data that can be selected, reviewed, or classified, and the ability to update and store the new information. The computer can present much more information to the student. When coupled with the corresponding problem solving and critical thinking skills involved in inquiry methodologies, it was seen as a powerful tool for both the teacher and the students. The ability to add new information fields and establish new relationships from the information is an important feature of databases as is the ability to get a printout or hard copy of the information.

The second part of the question, that asked about the limitations and disadvantages of a computer system, centered around the lack of availability of computers. The accuracy of the information and the need to see that the information obtained from a database is from a responsible source was of concern as was the improper use of the information. A few workshop participants felt that the time and technical skills needed to operate the computer could be prohibitive. Others thought the amount of data could be overwhelming and too quantitative in nature.

The final part to the question, that compared and contrasted electronic databases with more conventional information sources or by-hand systems, brought out several interesting comments. Written material may include more information and a broader scope from which to draw conclusions, but the larger percentage of respondents suggest that both share similar qualities and have different strengths and limitations. Both forms of information retrieval require the use of inquiry skills. Both electronic and by-hand systems are information reservoirs and the students must critically analyze the information independent of the source. The strengths of a database were reflected in their comments addressed in part one of the Game of the Week and the weaknesses of a database were covered by many respondents in their comments made in part two of the question.

Some Game of the Week samples from three inservice participants are quoted below:

First Participant

If students had access to a variety of computer databases and access to computers, I would spend several class periods introducing them to the software they would be using. These lessons would not be unlike what we as instructors have been experiencing when first introduced to Scholastic's World database or Bank Street School Filer. I would have the students work through exercises that would teach them various aspects of the programs to include: browsing, updating, changing information, saving, sorting records, and finding records.

They would begin to realize the ease with which they are able to manipulate data and the great capabilities of cross-referencing quickly, alphabetizing, organizing several different ways, and listing different criteria of their choice.

Time would be spent explaining to students the limitations of a database system to do their research. They would realize they must use a database that is already available commercially or produce one of their own (requiring research with the card catalog, periodicals, dictionaries, and encyclopedias). They are also limited to doing their research when they can get time to be on the computer. This fact would require them to organize and schedule their time differently.

Both types of research involve a similar process for the student. They must formulate the basis for their research, deciding what would be of interest for their project, what particular aspects to research, what facts to assimilate and correlate, and to draw their own conclusions. The database limits them again in what areas they will be able to collect data as it contains only information in the particular fields from which it is built. Having a current database that fits their needs will enable the student to do a lot of the tedious research more quickly and to compare data with ease.

Second Participant

If we had a variety of databases available for the class to use, it would change significantly the approach I use in my classes. At the present time when our students do research, we spend an extraordinary amount of time trying to round up the materials so the students can look up the information. The students have a tough time trying to find the information. This is very cumbersome, and the results are…frustration and failure. As a result of this problem, we limit the number of research activities that we do.

With a set of databases, we would be able to teach the students how to access the information and then how to process it. We would be able to teach the higher level thinking skills and thus, to foster higher quality work. This in turn would force us to change the way that we teach our classes. Many good students would be challenged, because they would better be able to use the thinking skills they have but seldom use. The so called good students would be forced to think rather than play PARROT. The poorer students would not have the excuse of not trying because they cannot find the information. Average students would be able to be successful, because they could access the information faster and could spend their time processing the information.

I believe that we learn by DOING. This is a type of activity that I think of as HANDS ON. The students can see that this is an easier way to do research, and they can see the results in a relatively short period of time.

The result of having computers available and several good databases available would change the way that I teach my classes. I believe this would enable me to teach more skills that my students would be able to use in their future.

Third Participant

Part 1

A computer system is capable of delivering a large amount of a certain kind of information quickly and efficiently. Numerical and statistical information is especially easy to get and use on a computer. Data can be manipulated very successfully; lists of facts can be sorted, categorized, and classified. Once these operations have been completed, the results can be displayed vividly and graphically without much effort from the computer operator.

Part 2

The usefulness of a computer system can be limited by the nature of the database. The database must contain the information that is needed in a format that is usable. The user must be familiar with the contents, quality, and mode of operation of each database. Additional effort and skill are required to combine and coordinate the information in different database systems.

Part 3

Both systems give information. The user must decide what to do with the basic facts and information. The judgment and creativity of the user determine the outcome. Both systems need to be updated with current information. Both systems may contain the bias of the "author." When using a computer system, the user should take advantage of its strengths. She/he should start exploring the potential of having access to a large amount of information and being able to manipulate that information in a number of ways.

4.2.5 Materials

This section of the Notebook is a place holder for handout materials specifically designed for use by the students of the inservice participants. Sample lesson plans might also be included. If the inservice is sufficiently long, a good assignment is to have participants develop sample-lesson plans and try them out with their students. These lesson plans can be handed out to all participants and also used as handouts in subsequent inservices.

The support materials for the Bank Street School Filer are extensive. They include well-conceived activities that can be done with the inservice participants. The examples are rather detailed and can be adapted to a variety of instructional settings. Because the support materials provided by the software publisher are so extensive, the developers of this Notebook felt that it was not necessary to include additional materials in this particular section.

In 1988 a Bank Street Filer workshop manual was published by Bank Street. It includes handouts, transparencies, and sample files useful in conducting inservices. Inservice facilitators will want to make use of some of these publisher-supplied materials during the inservice session. If the session is more than two hours in length, it is appropriate to have participants work through a number of the student activities.

The National Council for Social Studies has published materials stating goals and objectives for social studies education. These materials place substantial emphasis on information skills. They would make good handouts for this phase of the inservice.

4.2.6 Readings

The "Readings" sections of this Notebook are designed to supplement the materials presented during the inservice sessions. It is appropriate to assign these readings as "homework." The inservice facilitator may want to browse the recent issues of *The Computing Teacher* and other popular periodicals aimed at computer education leaders for suitable handout materials.

One goal in an inservice such as this is to get participants more used to reading the literature pertaining to their teaching area. *The Computing Teacher*, *Social Education*, and *The Social Studies* are three such magazines/journals that include information such as computer-oriented articles, book reviews, and software reviews that is useful to the social studies educator. There are a number of other periodicals available that include suitable reading material for the inservice. We have included an article on higher order/lower order thinking skills that may useful to share with your participants and a bibliography of some pertinent articles you may want to examine for possible inclusion in your sessions.

The Information Explosion

Dave Moursund

(From EDITOR'S MESSAGE in *The Computing Teacher*, December/January, 1986-87.)

Every once in a while I come across a statement that the totality of human knowledge is doubling every N years. Depending on the author, N years might be as few as four or as many as 12. All of the authors are trying to capture the idea that increasing numbers of researchers are using increasingly sophisticated tools to build on the work of previous researchers. We have an explosive, geometric growth of accumulated knowledge.

Generally, people don't carefully define what is meant by the totality of human knowledge. I suspect that this is difficult (if not impossible) to do, so I won't attempt it in this short editorial. However, I have a picture in mind that comes from my days as a mathematics student. I picture mathematics as a broad-based, but relatively vertical, discipline, with the research frontiers built on hundreds or even thousands of years of solid progress. Researchers at a university discuss some of their new ideas in graduate research seminars. A few of the ideas filter down to regular graduate courses. Over decades some of these ideas enter the undergraduate curriculum. Over hundreds of years, some of the ideas enter the precollege curriculum. For example, most of the precollege "new math" movement of the 1960s was based on math knowledge that was well over a hundred years old.

A troubling factor in this information explosion is that the capabilities of the human mind do not appear to be increasing. This leads to the situation where a student beginning to study a particular discipline will be able to learn a decreasing percentage of that field. Scholars who want to become researchers in a particular field respond by selecting narrower and narrower areas of specialization.

But what is the ordinary student or the generalist to do? How can one gain a solid grasp of a wide variety of fields, understand progress that is occurring, make use of the new knowledge being developed, and feel intellectually comfortable with the rapidly growing base of human knowledge? These questions are fundamental to the Information Age.

The answer lies in learning to build on the work of others—to avoid reinventing the wheel. This is the guiding principle of much of our academic coursework. The goal is to help students rapidly learn what researchers and scholars struggled with for years. For example, Newton and Liebnitz invented the calculus about 300 years ago, and this was a monumental achievement. But some high school students now learn more calculus than these initial researchers knew, because we have very good calculus books and teachers.

Mathematics provides a good example of the progress we can make through coursework, but also illustrates the major dilemma. As a rough estimate, I would guess that over the past 100 years a significant percentage of the college mathematics curriculum has been moved two years ahead in the curriculum. Freshman and sophomore mathematics majors study a great deal of material that was common in the junior and senior curriculum of 100 years ago.

Unfortunately, during that time the totality of mathematical knowledge may have increased by a factor of several hundred! Moreover, there has been an explosive growth of knowledge in many other disciplines. And new disciplines, such as computer science and genetic engineering, have arisen. Thus, there are ever-increasing demands on the student's time and learning capabilities.

Continual development of new curricula, better texts and learning aids and better teaching methods are all essential and helpful. But the fundamental issue is whether we can find still other ways to build on the work of others.

Computers offer a new, two-part answer. The first part of the answer is computer assisted instruction. Research evidence strongly supports the contention that via CAI many students can learn significantly faster. For this reason it seems inevitable that CAI will eventually be commonplace in our schools.

The second part of the answer lies in computers as tools for the storage, processing and retrieval of information, and as general-purpose aids to problem solving.

One can view a computer system as a passive information storage and retrieval device. In that sense it is like a library. But it is a significantly changed library: A 14-centimeter CD-ROM disk can store the equivalent of 500 books; a videodisc can store 54,000 pictures; and our telecommunications systems can provide easy access to computerized materials stored at distant locations. It is evident that computers, telecommunications and storage technology are significantly improving our access to information. Such access is essential to building on the previous work of others.

However, the key to coping with the information explosion does not lie just with improved (passive) access to information. The key mainly lies with the ability of computers to process the information. Computer storage of information differs significantly from library storage of information precisely because computers can also process the stored information.

For example, a computer can store demographic information along with maps, programs to represent the data on maps, programs to graph the data, programs to extrapolate trends, programs to perform statistical analysis such as correlating sets of data, and so on. These software tools can help solve some of the problems one addresses through use of the data. Such computer capabilities truly represent an extension of the human mind.

Essentially all of computer science is concerned with such extension of the capabilities of the human mind. But artificial intelligence focuses specifically in this area. Recent progress in artificial intelligence, including knowledge-based expert systems, is exciting! In essence, AI researchers have given us a method for capturing some of the knowledge of a human expert in a form that the computer can use to solve problems. A human can learn to use such a system, and thus to solve some problems at the level of an expert in a particular discipline, without spending the time necessary to become an expert in the discipline. All educators should be following this progress, since it is at the very heart of a new interface between education and the information explosion.

I draw two conclusions from the line of reasoning followed above. First, schools should focus increased attention on information storage and retrieval, and they should place particular attention on computer-related improvements in this field. And second, within every discipline students should learn to use computers as tools to help solve the problems of the discipline. The capabilities and limitations of computers as tools should be a clearly defined part of every academic course. This capability is our current best new aid to coping with the information explosion.

Bibliography

Below is a bibliography that lists a few additional articles that can be also used as reading material for the first few weeks of the inservice series. Not all the articles may suit your needs as an inservice provider, but they have been taken from commonly available sources and most social studies educators has access to one or more the magazines listed in this bibliography. In the reading section of the third session in this notebook there is an annotated bibliography that touches upon the content of some of these articles.

Hunter, B. (1983, May). Social studies education in the information society. *Social Education, 47,* 321-324.

Hunter, B. (1983 October). Powerful tools for your social studies classroom. *Classroom Computer Learning, 4,* 50, 55-57.

Litchfield, R.B. (1983 January/February). Computers in the history classroom. *The Social Studies, 74,* 37-39.

Pon, K. (1984, November). Databasing in the elementary (and secondary) classroom. *The Computing Teacher, 12* (3), 28-30.

White, C.S. (1985, March). PFS: File Review. *Social Education, 49,* 228, 230-231.

4.3

Session 3: Make Your Own Database

4.3.1 Narrative Overview

During the industrial period we needed a population that knew basic language and math skills, and emphasis was placed on content and rote recall. Capital and labor were viewed as the main engines of economic growth. Today capital and labor remain very important, but now technology has emerged as a major force. To use that technology we need an educated citizenry. If we intend to continue our economic growth, we need to invest heavily in both training and education. Just as the use of machines in the market place contributes to economic growth, so do properly educated people who use machines.

The amount of data, information, and knowledge that humans have accumulated is so overwhelming that no small group of people can retain and use more than a small percentage of it. Knowledge in some disciplines is so voluminous that to become an expert necessitates extremely narrow specialization. Two experts in a field such as physics, may have very little understanding of each other's narrow areas of specialization. In light of these conditions the question, "What types of learning and instructional methods need to be fostered to meet the needs of the modern era?" becomes even more compelling.

Teachers cannot expect to master even a small percentage of the overall knowledge of a subject that they teach nor of what is known about teaching and learning theory. This may mean that we place less emphasis on the knowledge level of teachers and greater emphasis on their ability to moderate and interpret vast amounts of information. The teacher becomes more of a coach and less a giver of facts. The teacher must become a person who is able to gather information, relate facts, explain inferences, form generalizations, and transfer these same abilities to students.

Living and working in an information rich world requires that people acquire a content education (knowledge base) consisting of facts and information about a subject. But more emphasis should be placed on teaching skills that address the needs of today's world, such as inquiry, critical thinking, decision making, and information processing abilities. Students need to acquire skills that enhance cooperation and participation in a community where communication is a way of life.

Perhaps most important of all, students need to be taught to be lifelong learners because content knowledge in all disciplines will continue to increase at a rapid rate. Andrew R. Molnar of the National Science Foundation said, "If we are to master information, we must expand human ability to learn and comprehend, and we must create new intellectual tools to extend human capacity to reason and to work smarter." This statement captures some of the essential requirements of the age and presents a fundamental challenge to the educational community. We must better understand how the human problem solver goes about solving problems, and how the computer as a problem solving tool can be better used in education.

Databases, spreadsheets, word processing, simulations, graphing programs, and other computer applications fall into the general category of problem solving tools. And while there are other ways to teach problem solving, the computer brings with it the ability to generate algorithmic solutions, apply problem solving heuristics to limited domains of activity, provide more realistic simulations, search and sort data, and generate environments that allow for a greater degree of in-context practice on certain problem solving skills.

The ability of databases to store, retrieve, and manipulate information gives the user tremendous power to manage information. Databases can be used to search and sort data much more quickly than a person can do by hand. But it is the person who needs the analytical skills to interpret the data. Thus, it becomes important to teach students inquiry, inference, and critical thinking skills.

The theme of teaching critical thinking skills is a major paradigm in social studies education. Critical thinking is not all forms of thinking nor should it be equated just with problem solving. It is the ability to assess the authenticity, accuracy, and worth of knowledge claims or arguments. Databases provide opportunities to involve students in such activities. This skill forms the major theme of session three.

Databases provide the opportunity for students to search data and make and test generalizations. Inference skills in such activities place emphasis on higher-order thinking skills necessary for students to develop capacities to make meaningful generalizations and therefore facilitate more meaningful decisions.

There are two common approaches to student use of databases. In the first, students learn to use databases that others have created. In the second, students learn to create their own databases. Both approaches are important, and both can occur early on as students learn about databases. In both cases the goal is to solve certain categories of problems. Generally speaking, a database is created with certain problems in mind. That is, it is designed to help facilitate solving a specified category of problems or to help answer a specified category of questions. Of course, generally one then also uses the database to address unforeseen problems and questions.

When students develop their own databases, they begin by determining what problems they want to address, or what questions they want to answer. This provides the foundation as they determine what data they need to collect, and how to categorize and label the data. In addition, by organizing seemingly unrelated bits of data into meaningful categories, students must critically assess the nature of the data.

This is the last session involving databases. By now participants should be reasonably comfortable in using databases to help solve problems. They should have a good understanding of some roles of databases in social studies education. They should have reasonable skill in posing questions that are easily answered using a database.

4.3.2 Script

Theme

Databases and problem solving.

Objectives

1. Computer use objective is to continue to familiarize the participants with the mechanics of computer use.
2. Instructional objectives are:
   a. Let the participants experience using a database to generate/test some hypothesis.
   b. Identify the characteristics of a formal problem.
   c. Make explicit the problem solving aspects of computer use in the social studies curriculum.
   d. Make explicit (by using a consultative format) how their experiences can be transferred to classroom and emphasis of *critical thinking skills*.

Abbreviations

Readers of this script and subsequent scripts should note that the following abbreviations are used.

LP—Lesson Plan
PA—Participant's Instructions
HO—Handout
OV—Overhead projector

Materials

Software
Sunburst Communications:
Bank Street School Filer
United States Database Disk
(a class set)

Handouts
LP 1-Databases
LP 2-Databases
PA1
PA2
Weekly Logs
Game of the Week

Refreshments

Note: It is nice to have variety. Fruit and cheese are nice!

Pre-Session

1. Place the Bank Street School Filer binder and the United States Database binder beside the computer.
2. Have the PA1 for the first activity on or near the computer.
3. Have a large screen monitor, overhead projector or blackboard available for demonstrations purposes.

Get Started
20 minutes

Purpose: Immediate involvement. This exercises will focus on using the database to draw inferences and critically examine the information for trends and explanations. The exercises in geography ask questions that require answers based on inference and hypothesis testing. A second component of this exercise is having participants develop their own databases either for their own personal school use or for use with the students in their classes. The performance aid for this handout starts at the very beginning by having participants take the disks out and boot the system as they were encountering the computer system for the first time without the aid of the inservice staff.

Discussion:

Draw the teachers away from the computer by asking them to turn off the monitor. When everyone's attention has focused on the inservice provider, then debrief the activity. Note how you are modeling appropriate behavior when you move participants from focusing on their computers to focusing on you.

Debrief:
30 - 40 minutes

Start the debrief by asking participants to share their discoveries and observations about the database activity. Indicate that this will be a long debriefing session and that such open discussions are a key part of an Information Age education system that emphasizes higher-order thinking skills. An important theme is that their thought processes were not used by the computer; the computer is merely "mechanically" following the steps of a program and directions specified by the computer user. It is the human user that is providing the thinking skills used in analysis and synthesis of information to generalize from the raw data. This theme is carried over into participants developing their own databases.

-How did they arrive at their observations or discoveries?
-What were their thought processes?
-What critical thinking skills are important to develop when looking at information?
-What critical thinking skills carry over to other areas of experience?
-What thinking/analysis skills are independent of the materials used?

All of these are metacognitive types of questions. There is substantial research to support having all students do metacognitive activities. The idea is to help students become much more aware of their own thought processes as they read and work on solving problems.

Students working on developing databases in the classroom also learn how to use the computer as a tool for their own ends, break information into parts and categorize that information, develop data acquisition skills useful in the library, learn to use other resources, practice social skills in working with others, and develop the sense of ownership that comes with doing something for their own purposes. The debriefing can examine these goals and objectives.

A second theme is assessing the accuracy and possible bias of information using critical thinking skills to examine any information presented in a database. This theme might be emphasized in a discussion of creating databases.

- How about making your own databases-- what are the advantages?
-What kinds of skills are required of students to make their own databases?
-Are these skills similar to those used in other media?
-What organizational skills are required?
-What types of information go into a database and who controls that information?
-How about issues of accuracy and responsible use of the information?
-What social skills can be developed in these types of activities?

Break
10 minutes

Refreshments (Note: Remind everyone that we will start again in ten minutes. There is a strong tendency for breaks to become longer and longer during a series of inservices.)

Set up

Hand out PA2 and the notebook material for the weekly homework, log sheets, and reading.

Introduction

As the participants return from their break, ask them to begin with PA2. This involves them in an activity until everyone is back from the break.

Activity
15 minutes

Purpose: This is an off-computer activity that will focus on problem solving as it applies to the social studies curriculum. It will also identify a general process of problem solving that can be applied to a number of different disciplines.

Discussion

With this activity, let the participants work first by themselves on PA2. Then put then in groups of 3 to 5 people and ask them to work toward a global definition of a problem. When small groups are finished, call the whole group together and begin to debrief. Generally the definitions will follow the schema outlined by Dr. David Moursund in a number of different publications such as his book on *Computers and Problem Solving: A Workshop for Educators*, published by the International Council for Computers in Education in 1988. His definition of a formal problem is as follows:

1. Givens — What is the given initial situation?
2. Guidelines (also called Resources) — This provides the rules or restrictions, the indication of the types of resources available as one works to solve the problem.
3. Goal — This is the desired end result or target.
4. Ownership — This gives meaning and motivation to solve the problem.

Ultimately, many social studies problems can be defined by paying careful attention to the four parts of a problem definition outlined above. We say that a problem is well defined for a particular person if the person has ownership of the problem and the givens, guidelines, and goal are all quite clear to the person. Near the end of the debriefing, this synthesis should be actively pursued if it has not already occurred. You can't solve a problem that you don't understand (that is not well defined for you).

Debrief:
40 minutes

First get each groups' definition of a formal problem and write it on the board; briefly discuss each of the definitions, looking for common threads. After each group has given their definition, ask the group as a whole to come up with a collective definition. It is at this time that you can begin to cast the responses into the four parts outlined above. In this debriefing you might use questions such as the following.

-Which group would like to share their global problem definition?
-Does another group have a definition that emphasizes the steps of a problem in a different way?
-What similarities can be seen in the different problem definitions generated by each group?

While problem solving is examined in the context of social studies and as a general activity independent of any particular subject, emphasis needs to be placed on how the computer can assist in the problem solving process. Using the four part definition developed by Moursund, the participants should be directed to look specifically at how databases can be used in this process. The important point here is that the participants can begin to see that databases can order and categorize information in routine ways, thus providing more time for analysis, synthesis, and evaluation by students.

What strengths and new dimensions does a database bring to the problem solving process?

This is the central question to the debriefing. The participants' answers will vary but most comments will center around the following:

a. Give easy access to information.
b. Present information in new ways. Present the same information in a number of different ways.
c. Characterize trends.
d. Illustrate concepts which include rules of inclusions and exclusion.
e. Draw conclusions and make inferences.
f. Test hypothesis.

As participants begin to analyze how a database can be used to help solve problems, keep the above list in mind to make more explicit ideas that are similar to those outlined above, but are not verbalized as succinctly or clearly. A very strong point is that information is power (as evidenced by the private business sector) and the ability to gather, sort/search and use that information is a powerful way to solve problems. The computer's ability to manipulate data allows students to implement and practice those skills and operations outlined in the list above.

This Weeks' Assignments

See Game of the Week. If you haven't already done so, have participants turn in last week's game of the Week. You may want to discuss the results of this activity.

Logs

Logs are to be filled out each week. Remind participants that they are an important part of the formative evaluation of the inservice series.

1. The logs should be turned in.
2. New weekly logs should be handed out.

Closure
5 minutes

1. Be positive about their contributions, and highlight their experience and expertise as classroom educators.
2. Review next week's activities.

Think Ahead

Announce next weeks activities and meeting place.

4.3.3 Timeline

Have the Bank Street School Filer binder and the United States Database binder beside the computer along with PA1.

0:00 - 0:20	**Initial activity:** This activity will focus on using a database to draw inferences and critically examine the information for trends. A second dimension to this activity is to examine the relative worth of having participants develop their own database for use with their students.
0:20 - 0:23	**Transition**: Draw the participants away from the computer by asking them to turn off their monitor so they can discuss the activity.
0:23 - 1:00	**Debrief:** Begin the debriefing by asking for participants to share their observations/discoveries about the database activity. Focus on the role of the computer in facilitating the use of the higher-order thinking skills such as analysis, synthesis, and evaluation.
1:00 - 1:10	**Break**
1:10 - 1:25	**Activity:** This is an off computer activity that focuses on problem solving in social studies and those characteristics of problem solving that can be generalized across a variety of different disciplines.
1:25 - 1:55	**Debrief:** While problem solving is the theme, emphasis needs to be placed on the role of the computer not only as a problem solving tool, but also as an instrument that can be used to teach problem solving skills. Particular emphasis must be placed on databases and computers in problem solving.
1:55 - 2:00	**Closure:** Discuss the log sheets, this week's assignment, the game of the week, logistical details, and other items of interest. Comment about next week's activities.

4.3.4 Handouts

The pages of this section are handout materials needed by the participants during Session 3 of the Social Studies Inservice. These materials are used by the participants as performance aids, course reference material, and as weekly assignment material. The facilitator may find it useful to make some of these into overhead projector foils for use during the inservice.

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CI^3 Social Studies Handout # 1: Week # 3

In the back of the **BANK STREET SCHOOL FILER** binder is a plastic folder containing 5 disks: 2 Program disks ; 1 School Database disk; 1 Classroom Tools disk; and 1 Tutorial disk. Notice that all the disks are labeled **BANK STREET SCHOOL FILER** but under each title is the specific name of the disk. For example beneath the title **BANK STREET SCHOOL FILER** is the subtitle **Program Disk-128K Version** for the program disk.

Step 1 Remove one of the Program disks. Close and set the notebook aside.

Step 2 Remove the program disk from its jacket by holding the label with the thumb and forefinger. Note: The surface of a disk is much like the surface of magnetic tape, but it is manufactured to more precise specifications. A bit of grease or dirt from your finger can mess up a disk. Do not touch the recording surface of a floppy disk!

Step 3 *Gently* slide the disk (label side up) into disk drive #1.

*For side by side disk drives, **ordinarily** drive #1 is on the left*
*For stacked disk drives, **ordinarily** drive #1 is on the top*

Step 4 Close the disk drive door by pulling the latch down.

Step 5 Turn on the computer. You'll find the switch in the lower left-hand corner in the back of the computer case. This process is called "**booting the system**".

*The disk drive may make a whirring noise. Don't worry. This is normal. This process is called "**loading**." A red light on the disk drive indicates that the disk information is being loaded into the memory of the computer. Do **not** open the disk drive door to remove a disk (or to put a new disk into the drive) while this red light is on.*

Step 6 Turn on the monitor (TV). Press down the button located in the upper right-hand corner of the screen. A green light behind the button should be lit.

Step 7 There will be some information about **BANK STREET SCHOOL FILER** displayed on the screen. **ADD RECORD** should be highlighted.

Step 8 You will now need the **UNITED STATES DATABASE DISK** binder. Remove the **United States Database Disk** from the pocket inside the *front cover* of the binder and set the binder aside.

Step 9 Remove the disk from its jacket. Insert the disk in drive #2 and close the door.

Step 10 Using the tab or arrow keys, highlight **OTHER.** Press RETURN.

Step 11 Highlight **RETRIEVE** (if it isn't already) and press RETURN.

Step 12 The program will ask, "Do you want a catalog? (Y/N)" Type Y for yes.

Step 13 The file you want to retrieve is **ECONOMY.** Type in ECONOMY and press RETURN. There is no password so press RETURN again.

Step 14 Open the **United States Databases** binder to page 53.

Step 15 You have completed steps 1 and 2 in the **GETTING STARTED** section. Continue with steps 3, 4, and 5. Choose at least two of the Activity Sheets to guide you. Maps have been provided for those Activity Sheets that require them. When necessary invent some marking scheme in lieu of colored pencils. Ignore any statements that require the use of materials not available to you in the workshop or that require the use of a printer. If you choose to print to the screen you will have to reference the **BANK STREET SCHOOL FILER** binder to find out the appropriate commands.

Step 16 Feel free to explore and to enjoy! Think of something that you would like to try, and then try it.

CI^3 Social Studies Handout * 2: Week # 3
(Problem Solving)

1. The purpose of this activity is to identify some of the problem solving components we use as social studies educators. The results of this activity are *not intended* to be handed in or shared if you choose not to do so.

A. Begin by getting in mind at least two different problems that educators consider to fall into the realm of social studies. You may want to briefly describe them in the space below.

B. Now think about the general characteristics of "problem" inherent to these examples and to the overall field of social studies. Write down what you consider to be a general or global definition of a problem. If possible, break your definition down into operational parts.

Game of the Week (Session 3)

Although a database allows one to organize, store and retrieve information easily, its real power is in allowing the user to organize data in different or new patterns to make inferences and substantiate hypotheses. For example, the following template could be used by students in an economics, history, or modern problems class to organize and select out information about different governments.

===

COUNTRY: United States
REGION: North America
FORM OF GOVERNMENT: Representative
POPULATION: 239,855,000
CAPITAL: Washington, D.C.
OFFICIAL LANGUAGE: English
% LABOR FORCE IN AGRICULTURE: 02
INFLATION: 4.6
GNP (IN BILLIONS): 3,664 **YEAR:** 1984
ANNUAL PER CAPITA GROWTH RATE (1960-81): 2.3
GOVERNMENT INTERVENTION IN MARKET: Little
RESOURCE ALLOCATION: Individual
OWNERSHIP OF RESOURCES: Private
INCOME DISTRIBUTION: Market

===

Using this database, students could select other countries that had characteristics similar to those in the last four entries above. They might conclude that all such countries are market economies as contrasted with those that are more mixed (like Yugoslavia) or command economies (like the U.S.S.R.).

Choose one area that you teach and develop a database template that could (or will be) used by you and your students to gather important data that can be used to determine trends, illustrate concepts, generate or test hypothesis, or confirm some theory. Fill in at least three different records that would be part of your database file. Give at least two examples of how this database could be used by a student to determine a trend, illustrate a concept, generate/test a hypothesis, or confirm some theory. Include in your report the specific course title and number that you might use such a database.

Write a very brief paper (it need not exceed one page) discussing the extent to which such database activities are relevant to the nature and type of social studies courses that you teach.

Game of the Week Outcomes

Database programs can be used to sort and search for information contained in the records. But that information is static and needs the interpretive/conceptual framework of the person using the database. It requires higher-order thinking skills to look for trends, illustrate concepts, generate/test hypotheses, or confirm some theory.

The Game of the Week answers from the participants ranged across the disciplines and involved concepts from military history to agricultural harvesting. There was reasonable agreement that databases are relevant to the social studies courses that are offered in our schools. One sample from a middle school participant is given below. A small database was created from a somewhat similar template, and it is also included.

A template similar to the one attached could be used by my fifth grade American History class when studying Native Americans. The template would include:

Tribe:
Region:
Food:
Tools:
Dwellings:
Clothing:
Leisure Activities:
Nomadic or Settled:

Concepts to be studied would include:

1. Does food supply influence leisure activities?
2. Does food supply influence the permanence of the dwelling?

```
File: SK                         REVIEW/ADD/CHANGE              ESCAPE: Main Menu

Selection: All records


Record 1 of 3
================================================================================
REGION: Southwest Indians
TRIBES: Hopi, Navajo, Pueblo
FOODS:  mutton, fried bread, corn, squash, beans
TOOLS:  bow and arrow, mortar and pestle
DWELLINGS: hogan
CLOTHING: breechcloth in summer, animal skins in winter




--------------------------------------------------------------------------------
Type entry or use @ commands                                   @-? for Help
```

```
File: SK                     REVIEW/ADD/CHANGE              ESCAPE: Main Menu

Selection: All records

Record 2 of 3
=============================================================================
REGION: Woodland
TRIBES: Mohawk, Iriquoi, Huron, Seneca
FOODS:  Corn, wild game (deer, elk, moose) berries, nuts, roots
TOOLS:  bow and arrow, hoe
DWELLINGS: longhouse
CLOTHING: deer hide, breechcloth



-----------------------------------------------------------------------------
Type entry or use @ commands                                  @-? for Help
```

```
File: SK                     REVIEW/ADD/CHANGE              ESCAPE: Main Menu

Selection: All records

REGION            TRIBES           FOODS             TOOLS            DWELLINGS
=============================================================================
Woodland          Mohawk, Iriquoi  Corn, wild game   bow and arrow,   longhouse
Northwest Coast   Bella Coola, Tl  salmon, herring   canoe, adze cl   central house,


-----------------------------------------------------------------------------
Type entry or use @ commands               @-? for Help
```

```
File: SK                     REVIEW/ADD/CHANGE              ESCAPE: Main Menu

Selection: All records

Record 3 of 3
=============================================================================
REGION: Northwest Coast
TRIBES: Bella Coola, Tlingit, Kwakiuti
FOODS:  salmon, herring, shellfish, smelt, sea lion, whale, bear, deer, elk
TOOLS:  canoe, adze, clubs, wood working tools
DWELLINGS: central house, multifamily dwellings, totem poles
CLOTHING:

-----------------------------------------------------------------------------
Type entry or use @ commands                                  @-? for Help
```

4.3.5 Materials

This section includes three different lessons on databases that can be used with students in the classroom. Each lesson can be used in more than one grade level and adopted to a number of different instructional activities. The commercial materials used in the sessions are also a rich source for lessons and ideas.

In addition, some more samples of database activities taken from inservice participants are also included. These activities are typical of those actually used or generated by classroom teachers in an instructional setting. While the actual database management system used in not important, many of these were done using AppleWorks.

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Events Leading to the Civil War

Description:

Topic: Events Leading to Civil War
Grade Level: 11
Time:
Grouping: small groups
Objectives:
1) Locate and gather information about events leading to the Civil War.
2) Classify information into significant categories.
3) How to express information into standardized form.
4) Make and evaluate hypotheses about events and actions of people leading to the Civil War.

Materials:

Software: any database program
Equipment:
Other Materials:

Before you start:

(1) Decide if this is to be an ongoing activity during the study of the Civil War or will be done as a concluding activity. The lesson can be spread out over a long time span or concentrated into a couple of days.
(2) Decide if you want the students to determine how to organize and classify the information. If so, they should develop their own fields. If not, then the following sample fields can be given to them.

Event name
Beginning date
Ending data
Length of event
Place occurred
Place: Union/Confederacy
Place: Slave/Free
Place: Territory/State
VIP Person
Person: Union/Confederacy
Person: Slave/Free
Person: view on slavery
Person: race
Cause of event
Effect of event
Increase/decrease chance war
Event type (speech, vote, conflict, law, court etc.)
Issue involved
Comments

Lesson: (Sequence of instructional activities)

(1) Students will research events that led up to the Civil War. Discuss what events are "important" and what information about the event is worth having in the dátabase.
(2) Students will classify the information, create fields, and decide on a standardized method of recording information.
(3) Enter information into the database.
(4) Have students explore the database using the browse, search (single field searches) and sort procedures to become familiar with the contents of the database.
(5) Have students make hypotheses about relationships between two or more fields. Justify the validity of the hypotheses with the data from the database. If students are not experienced in asking relational questions, provide them with a few sample questions.

Follow-up:

(1) Have students share their hypotheses and conclusions with other members of the class.
(2) Display hypotheses and results on the bulletin board.
(3) Follow the same procedure for future major events or adapt for current events studies as a "living database." (Here the class works together to decide on the fields that will go into a current events database. Then each day students add to the database.)

Comments:

1) This lesson is set up so that the teacher may use it as an organizing vehicle for the study of the pre Civil War period or as a concluding activity. In the former case, data can be entered continuously as the events are studied. In the latter, the data can be entered all at one time.
2) The teacher could start the exercise by providing the names of the events for the database (not necessarily the first event chronologically) and then assign students to find the data or the students could be given the task of deciding which events are worthy of inclusion.

Civil War Battles

Description:

Topic: Civil War Battle

Grade Level: 8

Time: 2-3 days

Grouping: small groups

Objectives:

1) Represent statistical information visually.
2) Find commonalities & differences in Civil War Battles.
3) Locate specific information and organize information in different forms.
4) Discover and justify generalizations about Civil War Battles.
5) Make use of math to help solve some problems.

Materials:

Software: Any database program

Equipment: software compatible

Other Materials:

Before you start:

(1) Create the following fields in your database program:

Name
Date began
Date ended
State/Terr.
Union Confed.
Won by
U. leaders
C. leaders
U. soldiers
C. soldiers
Battle Length *

U. killed
C. killed
U. wounded
C. wounded
U. captured
C. captured
U. % killed *
C. % killed *
U. % casualties *
C. % casualties *
U. % captured *
C. % captured *

Data for the fields can be entered by the teacher or as a separate exercise for the students. Fields marked with an asterisk can be calculated as part of the lesson. You might want to provide students with hand held calculators for this purpose. Some databases contain provisions for carrying out such computations.

Lesson: (Sequence of instructional activities)

(1) Have students explore the database using **browse**, search (single field searches) and sort procedures to become familiar with the contents of the database.

(2) Have students make hypotheses about relationships between two or more fields. Justify the validity of the hypotheses with data from the database. If students are not experienced in asking relational questions, provide them with a few sample questions.

(3) Calculate the battle length and percentages. This can be done by using the database manager's calculated fields (if available), or calculated separately and then entered by the students.

(4) Construct graphic representations of the data. If the database program has graphic capabilities, or the data can be transferred to another graphics program, this can be done by the computer If not, then students can construct their own graphs and charts. Pictographs, circle graphs, bar graphs, line graphs, and timelines are all possibilities.

Follow-up:

(1) Have students share their hypotheses and conclusions with other members of the class.
(2) Display hypotheses and results on the bulletin board.
(3) Display student's graphs on the bulletin board.

Comments:

1) Additional fields can be added by the teacher if there is other data she/he considers significant.
2) Formation of hypotheses can be formed away from the computer. Have students write: 1) a "natural language" question for a problem they want to solve and 2) a translation that meets the requirements of the computer search procedure.

Middle East Revolutions

Description:

Topic:
Grade Level: 6-9
Time:
Grouping: Students in Pairs
Objectives:
1) Students will gather data.
2) Students categorize information
3) Students will learn about database use
4) Students will practice generating hypotheses based on given facts
5) Students will practice drawing conclusions from given facts

Materials:

Software: Appleworks or a database application

Equipment: 1 Apple/2 students

Other Materials: Student Textbook research books

Worksheet: recording data

Before you start:

(1 Be familiar with the database software program you are using.
(2) Determine if this activity will require students to gather information solely from the textbooks or if library research is desired.
(3) Determine if this activity will be done as a unit activity or as a review activity.
(4) Make sufficient copies of the worksheet: recording data.
(5) Determine the pairing of students who will work together.
(6) Decide if students will create the fields or if you will create the fields.
(7) Prepare enough data disks with the selected fields for each group of students to use. (Note: if only one computer will be used, set up a schedule for when each group can use the computer.)

Lesson: (Sequence of instructional activities)

(1) Pair the students and hand out the worksheet for database planning (see attached handout).
(2) Review with students what kind of data should be recorded.
(3) Have students explore the database using **browse** option. Discuss what, if anything, students discovered.
(4) Have students **arrange** in chronological order according to date of revolution. With records arranged in this fashion, it will be easier for the students to see any progression in the historical aspects of the Middle Eastern revolutions.
(5) Students can **find** all records that contain the phrase, "western dress". This will give them an example of how they may find specific items rather than browsing through the entire database. Have students discuss the results of their "find."
(6) Students can **select** all records in which the resource is "agriculture".

Another **select** activity might be, all records in which the religion is "Muslim" *and* the changes made contains "western dress". Have students experiment with the **select** option some more. Discuss what was discovered. This should help students begin to develop some strategies for record selection.

Follow-up:

(1) Using the information in the database, have students write an essay or a report about the changes that have taken place in the Middle East as a result of the revolutions.
(2) Have students prepare a time line which can be displayed in the room and serve as an aid during the unit of study.
(3) Have students choose one of the Middle Eastern countries to research further.

(4) Have students make a graph of the statistical aspects of each country. This can be done by hand or with a graphing program.

(5) Students can create a Venn Diagram of particular "selections" to gain a better understanding of how the **select** process works. (See attached activity sheet).

Comments:

1) This activity assumes that the students are familiar with the basics of a database.

2) Instead of having each student create a database for the Middle East, assign each group of students to a particular country in the Middle East to research and keep data on.

3) The activity assumes access to a computer lab with enough computers to allow one per pair. If only one computer is available, the teacher can demonstrate the database using a large screen monitor. Students can use their planning record sheet to keep track of the information. Only one data disk should be needed since each group can enter the information into the same disk.

SAMPLE DATABASE PLANNING SHEET

TOPIC *Middle East Revolutions*
FILE NAME *Turkey*
APPROXIMATE RECORDS NEEDED *8-15*

FIELD NAME	DESCRIPTION
1) Country	*Turkey*
2) Leader	*Mustafa Kemal*
3) Empire	*Ottoman Empire*
4) Religion	*Muslim*
5) Largest City	*Istanbul*
6) Capital	*Ankara*
7) Major Resources	*agriculture*
8) Revolution	*1922*
9) Reason for defeat	*government became weak*
10) Changes made	*people wear Western dress,* *take family name*
11) Comments	______________

This record sheet goes with the Middle East Revolutions database activity. It is a sample of the kind of fields that students can find information about. Add to the fields or delete from them as suits your own classroom needs. Students should have enough copies to fill one sheet per file.

Oregon State Senate

This exercise will be used in Senior Government classes. Each spring we run a simulation of the Oregon State Senate. A database such as the following would be useful.

COUNTY: Baker
AREA: 3,089 square miles
POPULATION: 16,000   1940: 18,547
PRINCIPAL CITIES: Baker
PRINCIPAL INDUSTRIES: Farming, Ranching, Logging, Recreation
TRUE CASH VALUE: $526,885,488
VOTER REGISTRATION: Democrat 5,018   Republican 3,830
COUNTY COMMISSION: Larry Smith (D), Ben K. Dunleavy (R), Rodney McCulolough (R)
PER CAPITA INCOME: $4,626
URBAN POPULATION: 9,000   RURAL: 7,000
MINERAL PRODUCTION: Cement, stone, sand and gravel, gold, clays, silver,
pumice, copper, lead, zinc
BOARD FEET OF LUMBER PRODUCED: 546,000,000

The database would be used by students to determine the likely political climate of the county.

It can also be used to give the "legislator" an idea of what particular issues would be of concern to his/her constituents. This would be useful in voting on various issues, and would be particularly useful in knowing what committee appointments to seek.

Agriculture and Non-agriculture

Problem #1:	In nations with populations greater than 200,000,000, what is the relationship between the amount of population in agriculture and non-agriculture, and per-capita income?
Problem #2:	In nations with populations greater than 200,000,000, is there a relationship between the amount of arable land and the percentage of the population employed in agriculture?

Country: People's Republic of China
Region: Asia
Form of Government: People's republic
Population: 1,037,588,000
Capital: Peking
Official language: Mandarin Chinese
% of Arable Land: 11%
Inflation: 2.7%
GNP (in billions): $313 (1986)
Per Capita Income: $566 (1980)
Labor force: 74% agric.; 15% ind. and comm. .
Defense Spending: 8.5% of GNP

Country: India
Region: South Asia
Form of Government: Federal Republic
Population: 767,681,000
Capital: New Delhi
Official language: Hindi and English
% of Arable Land: 57%
Inflation: 5.6%
GNP (in billions): $190 (1983)
Per Capita Income: $150 (1977)
Labor force: 70% agric.; 19% industry and commerce
Defense Spending: 3.5% of GNP

Country: Union of Soviet Socialist Republics
Region: Europe and Asia
Form of Government: Federal Union controlled by Communist Party
Population: 277,504,000
Capital: Moscow
Official language: Russian
% of Arable Land: 27%
Inflation: NA
GNP (in billions): $737 (1984)
Per Capita Income: $2,600 (1976)
Labor force: 19% agric.; 29% ind; 26% services
Defense Spending: 12-15% of GNP (1983)

Country: United States
Region: North America
Form of Government: Federal Republic
Population: 238,631,000
Capital: Washington, D.C.
Official language: English (not official)
% of Arable Land: 21%
Inflation: 4.2%
GNP (in billions): $3,855 (1985)
Per Capita Income: $13,451 (1985)
Labor force: 3% agric.; 87% ind. and comm.
Defense Spending: 6.8% of GNP

Good Books to Read

The attached database template could be used in my fifth or sixth grade reading class. Students could compose a new kind of "book review." After each student enters his/her book review into the database, other students can then use the collection of reviews to search for one or more books by area of interest, author, or rating. If students do not know what to read, they might scan for a friend's name and see what books they have read.

The creation of the database reinforces important concepts for research and using the card catalog. The students also gain competence and confidence in using an information storage and retrieval system. Many students will be familiar with using such a system if they use the Public Library. They will see another value in knowing and understanding the process.

File: Book Review REVIEW/ADD/CHANGE ESCAPE: Main Menu

Selection: All records

Record 1 of 3

Title: Cat Ate My Gymsuit
Author: P. Danziger
Subject: School
# of pages: 119
fiction: x
nonfiction: -
biography: -
autobiography: -
Theme: A teacher is fired.
rating (1-10): 3
Age: 10
Reviewer's Last Name: Souza
First Name: Sandra
Review: Students try to get the school committee to rehire a teacher. She was
Review: fired for not saying the pledge of allegiance.

Record 2 of 3

Title: Laura's Luck
Author: Sachs, Marilyn
Subject: Camp
# of pages: 216
fiction: x
nonfiction: -
biography: -
autobiography: -
Theme: All the things that happen at camp.
rating (1-10): 7
Age: 10
Reviewer's Last Name: Freeman
First Name: Kira
Review: Laura thought camp would be bad, but she had good luck, because
Review: she met a friend. They get into all kinds of neat adventures.

Record 3 of 3

Title: Black Beauty
Author: Sewell, Anna
Subject: Horse
# of pages: 68
fiction: x
nonfiction: -
biography: -
autobiography: -
Theme: The life story of one horse.
rating (1-10): 9.5
Age: 9
Reviewer's Last Name: Freeman
First Name: Meggan
Review: This book is kind of sad. You read about all the different homes Black
Review: Beauty has, how he save his mistress's life and becomes ill.

A Database of Information About US Presidents

President of the United States

- Name
- Born
- Birthplace
- College or University
- Religion
- Occupation
- Political Party
- Age at Inauguration
- Served
- Died
- Age at Death
- Runner-up
- Vice President

Additional Information

- Wives
- Children
- Health
- Disabilities
- Home State
- Cabinet
- Accomplishments
- Veto Power Used
- Appointments
- Previous Political Experience
- Assassination
- Etc.

Note: The dividing line between lower-order skills and higher-order skills is often not clear. Generally speaking, formulating an "interesting" question is a higher-order skill than answering a good question that someone else has formulated. A database can be used for lower-order skills development. A number of questions are given below. If students use a database that a teacher or commercial publisher has provided, and merely answer these types of questions in a non-thinking and routine fashion, they will not be gaining higher-order thinking skills.

1) What 2 former presidents died on the same day?
2) Which presidents are buried in National cemeteries?
3) Who was the only man whose father and son both became president?
4) Who was the first president sworn into office by a woman?
5) Who was the only child of a president to be born in the White House?
6) Which presidents were assassinated?
7) What other presidents died in office?
8) Who was the first president born after the adoption of the Constitution?
9) Who was the first president to speak on radio?
10) What presidential actions have led to the expansion or limitation of Presidential powers by Congress?
11) When have presidential pardons been used and what political purposes have been served by use of the pardon?

President of the United States
Name: John Adams
Born: Oct. 30, 1735
Birthplace: Braintree, Mass.
College or University: Harvard
Religion: Unitarian
Occupation: Lawyer
Political Party: Federalist
Age at Inauguration: 61
Served: 1797 - 1801
Died: July 4, 1826
Age: at Death 90
Runner-up: Thomas Jefferson - 1796
Vice President: Thomas Jefferson - 1797 - 1801

President of the United States
Name: William H. Harrison
Born: Feb. 9, 1773
Birthplace: Berkeley, Va.
College or University: Hamden-Sydney
Religion: Episcopalian
Occupation: Soldier
Political Party: Whig
Age at Inauguration: 68
Served: 1841
Died: Apr. 4, 1841
Age at Death: 68
Runner-up: Martin Van Buren - 1840
Vice President: John Tyler - 1841

President of the United States
Name: James A. Garfield
Born: Nov. 19, 1831
Birthplace: Orange, Ohio
College or University: Williams
Religion: Disciples of Christ
Occupation: Lawyer
Political Party: Republican
Age at Inauguration: 49
Served: 1881
Died: Sept. 19, 1881
Age at Death: 49
Runner-up: Winfield S. Hancock - 1880
Vice President: Chester A. Arthur - 1881

President of the United States

Name: Richard Nixon
Born: Jan. 9, 1913
Birthplace: Yorba Linda, Calif.
College or University: Calif (Whittier)
Religion: Friend (Quaker)
Occupation: Lawyer
Political Party: Republican
Age at Inauguration: 56
Served: 1969 - 1974
Died:
Age at Death:
Runner-up: Hubert H. Humphrey - 1968 / George S. McGovern - 1972
Vice President: Spiro T. Agnew / Gerald R. Ford / Nelson A. Rockefeller

Civilizations of Mesopotamia and Greece

A database like the one I have designed could be used in my Sixth Grade Social Studies class. We are presently studying the early civilizations of Mesopotamia and Greece.

One activity the students could do with this database would be to make a timeline of the development of early civilizations. The students would select "date" and sort from high to low. With this information they would be able to design their timeline.

Another activity using the database would be to compare types of religion and forms of government from each civilization. The student would select all records where religion contains "polytheism." From this students would browse the records to see what type of government the civilization had. The students should be able to identify trends and draw conclusions from this information.

Record 1 of 3

==

Name: Ur
Currently: ruins in Iraq
Date: 3000 B.C.
Civilization: Sumerian
Government: theocracy
Religion: polytheism
Occupations: farmers, artisans, scribes
Products: bronze tools, pottery, baskets, barley, sheep
Communications: cuneiform on clay tablets

Record 2 of 3

==

Name: Mohenjo-Daro
Currently: ruins in Pakistan
Date: 2000 B.C.
Civilization: Indus Valley
Government: unknown
Religion: early form of Hinduism (many gods)
Occupations: merchants, farmers, artisans
Products: copper, bronze, glazed pottery, furniture, cotton cloth, wheat
Communications: pictographs on stone (which have never been translated)

Record 3 of 3

==

Name: Mycanae
Currently: Mycanae, Greece
Date: 1300 B.C.
Civilization: Mycenean
Government: theocracy
Religion: polytheism
Occupations: farmers, merchants, soldiers, scribes
Products: pottery, olive oil, weapons
Communications: writing in early Greek

4.3.6 Readings

Bibliography

The "Readings" sections of this Notebook are designed to supplement the materials presented during the inservice sessions. It is appropriate to assign these readings as "homework." The inservice facilitator may want to browse the recent issues of *The Computing Teacher* and other popular periodicals aimed at computer education leaders for suitable handout materials.

One goal in an inservice such as this is to get participants more used to reading the literature. All social studies teachers should be aware of the publications that are directed at social studies educators.

The first part of the readings includes a short bibliography of articles on databases that apply directly to the third sessions' activities. This bibliography is followed by a more extensive annotated bibliography that covers many of the articles used in the first three sessions. This annotated version may be a useful handout for participants.

Bilof, E.G. (1987, January/February). How to design and use a culture area database with PFS:FILE and PFS:REPORT. *The Social Studies, 78,* 35-41.

Davison, B. (1987, January/February). SCAN: Setting up a national database in global/international education. *The Social Studies, 78, 42-43.*

Dribin, C.I. (1985, June). Spreadsheets and performance: A guide for student-graded presentations. *The Computing Teacher, 12* (9), 22-25.

Hodges, J.O. (1985, January). Developing your own microcomputer courseware with authoring tools. *Social Education, 49,* 59-62.

Annotated Bibliography

Bilof, E.G. (1987, January/February). "How to design and use a culture area database with PFS:File and PFS:Report. *The Social Studies,* pp.35-41.

As the title suggests, this article contains a description of how to design and use a culture area database. The author defines such a database as, "a collection of information on a geographical region whose inhabitants share certain common beliefs and behavior patterns." Bilof has included comments on the advantages and limitations of PFS: File and PFS: Report for this activity. He then goes on to discuss the topics of how to design a file form, using PFS: Report to create tabular reports from the database; and the educational benefits derived from this activity. The example used is a non-Western world cultures course at the secondary level.

Hannah, L. (1987). Teaching data base search strategies. *The Computing Teacher, 14* (9), pp. 16-23.

Hannah believes that data base activities have the potential to aid students in developing the higher-level thinking skills of probing into content, asking critical questions, and testing conclusions. The article contains several data base activities that the author has used with students. Hannah suggests that the activities are appropriate for students from fifth grade through high school. He also suggests that these activities will help train students to focus on data base search strategies so that they will learn more about the content being studied, as well as become better and more critical thinkers. The article includes worksheets that are designed for the *Appleworks* data base but can be adapted to other programs. The activities are centered on the U.S. presidents and vice presidents.

Hively, W. (1986, February). Half the fun is getting there. *Electronic Education,* pp. 14-15.

This article is a review of several database programs spanning the range from elementary to high school. Included in the review are the following structured databases: *Create-a-Base* (grades 4-6), *Notebook Filer* (grades 4-9), *Friendly Filer* (middle and junior high school), *Life Science Database* for PFS File. A review is also given of an unstructured database, called, *Rapid Recall: An Electronic Notebook.*

Hodson, Y.D. & Leibelshon, D. (1986, May). Creating databases with students. *Library Computing,* pp. 12-15.

This article contains a description of the authors' implementation of database use in their school. They combined learning library skills with how to create databases to help their students become computer literate. The authors outline four levels (Operating Knowledge, Application, Combining, Innovation & Invention) of how small databases can be used in any grade level with students of varying abilities. In addition, they suggest four stages to implementation, as well as a time frame for each stage: 1) Instructional (two weeks) 2) Development (two weeks) 3) Utilization (ongoing) 4) Expansion (ongoing).

Hunter, B. (1985). American Indian data file: How to make and use a data file on American Indian cultures. *Teaching and Computers.*

This article is a description of a teaching unit, using a database, to help students learn about different groups of Native Americans. The unit includes directions for designing a data file, discussing terms in the file, preparing students for research, gathering and entering data, and using the file. While the unit activities were designed to be used with the *Scholastic pfs: file* data management program, they can easily be adapted for use with other programs.

Hunter, B. (1985, March). The case for a classroom database. *Instructor,* pp. 54-58.

A mini-unit is offered as an activity which the teacher can use to show students how to set up or build their own databases. While the unit centers on television, the ideas presented can be applied to any subject or topic. In addition to the five-step outlined unit, Hunter provides technical suggestions on the basics of database. She has also included a brief review of several database software programs.

Hunter, B. (1987, January). Knowledge-creative learning with data bases. *Social Education,* pp. 38-43.

In this article, Hunter describes classroom activities using data management tools. Each activity supports one of the three major goals of social studies: skills, content and democratic values. According to the The National Council for the Social Studies Task Force on Scope and Sequence, the essential social studies skills can be outlined into three main categories: acquiring information; organizing and using information; and interpersonal relationships and social participation. The author suggests that "data management tools are ideal aids to learning and applying these skills to systematic modes of inquiry and reasoning." The activities suggested in this article can be used with one computer in the classroom.

Hunter, B. (1985). Problem solving with data bases. *The Computing Teacher, 12* (8), 20-27.

Hunter gives some practical advice and suggestions for the introduction and general use of databases in the classroom. There are three stages of learning with databases: 1) Using data files that have been created by someone else for the purposes of discovering relationships, testing hypotheses, looking for trends, identifying commonalities, investigating new subjects, helping to solve problems, 2) Building data files using a template or form that has been designed and tested by the teacher or someone else, and 3) Designing data files where the student does the planning, building and using of his/her own files. Hunter suggests several diverse activities involving databases at each level.

Ingber, P. (1986, March). Software: Side by side: Data base programs. *Electronic Learning,* pp. 42-43.

The article is a comparative review of the following data base software programs: *Scholastic PFS: File, Friendly Filer, Rapid Recall: An Electronic Notebook, Appleworks* , and *Versaform*. Each program is rated on Expandability, Screen Display, how Fit it is for Students, Ease of Learning, Ease of Use, Support Materials and Overall Value. The reviewer has included a description of each program, its level, general comments, and publisher's response.

Jonassen, D.H. (1986, Winter/Spring). Improving recall using database management systems: A learning strategy. *AEDS Journal,* pp. 109-123.

The author describes the application of the database management system, as a computer tool for helping learners integrate, organize, and interrelate concepts as a learning strategy (recall). Jonassen describes two learning strategies: Cross Classification, and the Node Acquisition and Integration Technique (NAIT). In the first strategy, cross classification (or matrix outlining), learners construct two-dimensional tables which categorize words in both dimensions simultaneously. The learners, "compare-and-contrast analysis that can be applied to any group of related words." The second strategy, NAIT, is one that helps students organize a network of relationships between the concepts. This involves a four-stage process: a) identify the key concepts b) define those concepts in terms of their relationships, c) elaborate or make them more personally meaningful, and d) compare the concepts, relationship-by-relationship. Jonassen goes on to suggest that in the process of creating and manipulating a database, the learner is actively building knowledge structures.

Kreuger, S. (1987). Brontosaurus meets the computer. *The Computing Teacher, 14* (9), 13-15.

This article contains a description of a computer applications unit activity on dinosaurs that can be used with fourth, fifth, and sixth graders. While learning about dinosaurs as well as developing computer and research skills is the main objective, the author believes that the top priority of the unit is the development of the student's higher-level thinking abilities. *The Dinosaur Packet* (including 96 pages of written activities and a data disk) using *Appleworks* , is available for $25 from the Math Learning Center, P.P. Box 3226, Salem, Oregon 97302; phone: (503) 229-3041. A MECC *Dataquest Composer* version is available.

Mendrinos, R.B. & Morrison, D.M. (1986, October). The Irish Immigrant Experience: How the program works. *Classroom Computer Learning, 14* (9), 42-43.

As the title of the article indicates, the authors describe how the simulation, "The Irish Immigrant Experience," works. It is a tool software program (word processor, database management system and spreadsheet) designed for Junior High students to aid in the study of immigration in the 1800's. The program consists of 5 sections and is used in conjunction with *Appleworks* : 1) "Adoption of a family after sorting through a list of passengers on a ship from Ireland that arrived from Boston (based on real passenger lists). 2) Exploration of databases concerning housing and transportation in Boston during the 1840's and 1850's. Based on this search, students make decisions for their "families" regarding housing, employment, etc. 3) Decisions about housing, clothing, food, jobs are entered into a spreadsheet template, in order to make projections on income and expenses on a weekly, as well as yearly basis. 4) New data is used to make decisions for 1850-1860. 5) The process is repeated with a different family with the intention of comparing outcomes. All decisions are recorded on a journal or diary. The program is public domain. There is a $25 shipping and handling charge. To order, write to: Donald M. Morrison, Educational Technology Center, 337 Gutman Library, Appian Way, Cambridge, MA 02138.

Morrison, D.M. & Walters, J. (1986, October). The Irish Immigrant Experience: Origins of the project. *Classroom Computer Learning,* pp. 40-41.

This article is a description of the development of social studies simulation that also helps kids learn *Appleworks*. "The Irish Immigrant Experience" was developed by researchers at Harvard's Educational Technology Center (ETC) as a result of a 1984-1985 investigation of the educational impact of use of tool software programs (word processors, database management systems and spreadsheets) in Boston schools. The researchers found that "without well-conceptualized curriculum materials and well-developed models for their use, teachers find integration of technology difficult and fitful." The ETC group developed the simulation to serve as an experimental curriculum unit that would provide a model for the use of tool software.

Pon, K. (1984, November). Databasing in the elementary (and secondary) classroom. *The Computing Teacher, 12* (3), 28-30.

In this article, the author describes the use of database management, as in inquiry tool, in her third-fourth grade combination class. According to Pon, "The application of database management for inquiry is grounded in cognitive learning theory as it operates within Piaget's framework of the concrete, symbolic and abstract learners." Students gathered data about a specific topic, then designed a form to display the data. Teacher-conducted small-group sessions at the computer enabling students to generalize about related attributes. Pon believes that her students became more critical than she expected in examining findings. Finally, the author offers her comparison of 3 commercial Database Management Programs: *Instant Recall, Quickfile,* and *DB Master*.

Rooze, G.E. (1986, March/April). A strategy for helping students draw conclusions. *The Social Studies*, pp. 74-76.

In this article, Rooze suggests that the database is an important tool for teaching thinking in the social studies. Rooze offers a model of "instructional interaction" to illustrate the importance of teacher actions in using mediating devices. Instruction consists of Teacher Actions (TA), use of some Mediating device (M), and Student Actions (SA). A change in any one of these components will influence learning outcome. Rooze believes that the selection of mediating device (e.g. database) does make a difference and a number of important skills can be taught through the use of databases in social studies. The success of database use for teaching thinking in the social studies depends on the teacher and what is done to help students draw conclusions from this mediating device.

Schneider, M.S. (1987, October). Make a paper data base. *Teaching and Computers*, pp. 42-44.

Mr. Schneider's article is a lesson plan for making a paper data base in order to help students understand the concept of how an electronic database actually works. While the activity uses information about the solar system, Mr. Schneider suggests that the activity can be adapted to any topic. The lesson includes a discussion about *data: files, records, fields, and searches* followed by activities using each of these topics.

Swett, S. (1985, May/June). All-American data files: Teach U.S. history and geography with these data base activities. *Teaching and Computers,* pp. 18-25.

Ms. Swett's article is a teaching unit which shows how to set up data files on historical, geographic, and trivial facts about all of the 50 states. Four extension activities are included to use the data to draw some interesting conclusions about the states. The activities are: Play the State Search Game, Graph the Stats, Make Venn Diagrams, Design Attribute Trains. While the activities were designed to be used with the *Secret Filer* database program, they can be adapted easily for use with any other program. The article includes a chart of reasonably priced database programs and reproducible student activity sheets.

Thomas, R. (1988). The student-designed database. *The Computing Teacher. 15*(5) 17-19.

This article is a lesson plan for creating and using a database. It is designed for advanced eighth graders to high school seniors. The actual lesson involves approximately 10-14 class periods. Mr. Thomas suggests that creating and using a database generally consists of 13 steps. Only a few of the steps require the use of a computer. Some of the steps included in the article are: identifying the problem; analyzing the scope of the problem and the appropriateness of using a computer to explore it; doing research to gather the necessary information; and Summarizing your work and conclusions in a report. The material in this article is from *Classworks: Appleworks for the Classroom,* published by the International Society for Technology in Education (ISTE) (Eugene, Oregon).

Wheeler, F. (1987, March). The new ready-made databases. *Classroom Computer Learning,* pp. 28-32.

The author suggests several questions for consideration before the purchase of a ready-made database. For example, "Do computer resources and time match the requirements of the program? What type of sorting, searching and reporting features do you consider important? Does the database provide information that goes beyond what is readily available in your school library?" In addition, the author offers an explanation and definition of "computerized database and the vocabulary associated with it. The author suggests that the use of databases in schools will help students to discover relationships in a way that textbooks and various other reference materials alone cannot. Finally, examples are given of the various kinds of other databases available on the market, the pros, as well as the cons of each.

4.4
SESSION 4: Introduction to Computer Simulations

4.4.1 Narrative Overview

Transfer of learning is one of the most important ideas in education. We want students to be able to transfer what they are learning from the classroom to other situations. Researchers talk about near transfer and far transfer. In the same sense that "beauty is in the eye of the beholder," it is generally acknowledged that whether a particular transfer is near or far depends on the particular person attempting to make the transfer. However, we know a great deal about creating training and education settings that are seemingly "near" to application situations. Most people find that they can readily transfer knowledge and skills gained in such situations to the intended application area.

Airplane flight simulators provide an excellent example. It is possible to build a flight simulator that is very realistic. A person "flying" the simulator has a hard time telling the experience from actually flying a real airplane. Thus, experience gained in the simulator readily transfers to flying a real airplane.

Some social studies teachers frequently make use of simulations or simulation games to engage their students and to help teach important concepts. The simulations contain key ideas that are enough like their corresponding "real world" counterparts so that many students transfer learning from the simulation to the real world. In recent years a large number of computer-based simulations have been developed for use in social studies education

A computer is useful in many simulations because it can keep detailed records, provide for large numbers of alternatives, and facilitate group interactions. Because the computer can be used to model events similar to real life situations, it brings added power to the instructional process. Just as the computer can teach certain basic skills as well or better than traditional methods, it can also assist in teaching certain problem solving skills.

There is strong research evidence that supports use of computer-based simulations in education. For example, it has been shown that computerized science simulations can provide students with more productive practice in problem solving than other more traditional instructional methods.

Simulations that use guided discovery seem to be the best use of a computer simulation. Students are led to "discover" key ideas. Students using the guided discovery approach tend to surpass other students on tests of scientific thinking, and on the test of critical thinking. This suggests that some computer simulations may educate students in such a way as to be able to generalize skills to other more novel settings. Other studies involving computer simulations have indicated that skills learned using a simulation are as effective as more traditional non-computer methods and in certain cases the students performed as well as other non-computer using students in one-quarter the time. Simulations involving spatial skills have also shown positive results. And finally, there is a strong indication that computer simulations of lab experiments can be as effective as other instructional methods involving labs and paper and pencil exercises.

In the two sessions involving simulations, we continue with a strong problem solving theme. The schema on problem solving continues to play a central role in the debriefing. Work on having participants identify the types of problems that students are learning to solve through use of computer simulations. Continue to stress the need to identify and understand the givens, guidelines, goal, and ownership in a problem. Stress transfer—learning-problem solving methodology that is applicable across a wide range of problems.

A major aspect of this first session on simulation is to identify those characteristics of simulations that make them a useful classroom activity and to characterize the unique qualities that a computer brings to simulations in an educational setting. Simulations tend to be motivational, as they give the students a chance to involve themselves in decision making, critical thinking, active participation, procedural experiences, and social and group problem solving activities. The intellectual and social skills that the students practice are useful experiences and provide strong justification in education for using simulations as individual and social problem solving activities.

The computer brings a level of sophistication and realism that is hard for other types of simulations to develop. It can provide dynamic, real time scenarios that do not have obvious human authorship. By using random events the simulation can provide a complexity not given to the more traditional non-computer simulations and the immediate feedback can be a strong motivator to deepen the involvement of the students in the activity.

There are many high quality non-computer simulations available for use in social studies. But relatively few social studies teachers make extensive use of such simulations. Part of the difficulty is the complexity and time consuming nature of setting up a simulation and keeping the necessary records. A computer can help here. Part of the difficulty is that superficially it appears that simulations provide a rather slow-paced learning environment. It may be argued that the time might better be spent in a lecture or reading mode. However, students tend to remember what they cover in a simulation much better than they remember what is covered by lectures and readings. All in all, many social studies teachers may well improve the effectiveness of their courses by appropriate use of simulations.

Some simulations are quite computer intensive. They may require one computer per student and a great amount of compute power. Others are specifically designed for the school or classroom that has few computer facilities; some require only one computer for an entire class.

4.4.2 Script

Theme: Simulations and their classroom use.

Objectives:

1. Examine the role of computer simulations as a tool to teach problem solving skills.
2. Examine roles of simulations, both non computer and computer, as an aid to teaching problem solving in the social studies.

Abbreviations: Readers of this script and subsequent scripts should note that the following abbreviations are used.

LP—Lesson Plan
PA—Participant's Instructions
HO—Handout
OV—Overhead projector

Materials:

Software	*Handouts*
President Elect. (a class set)	PA for President Elect LP 1 Weekly Logs Game of the Week

Refreshments

Assumptions

Participants have encountered simulations or simulation games and have some appreciation for their potential value in education. Some participants have made use of simulations in their teaching.

Pre-Session

1. Boot up the software and set the parameters such that the simulation is ready to play. With this activity the simulation should be structured to give the participants all the possible advantages. If you have the game begin at Week 5 of the campaign, this should allow participants to finish the simulation and will allow time left to debrief the activity.
2. Have the Performance aid for the first activity on or near the computer.
3. Have a large screen monitor, overhead projector, or blackboard available for demonstrations purposes.

Introduction
75 minutes

Purpose: President Elect is a computer-based simulation of a presidential election and requires the participants to solve a variety of problems. The simulation can be used with a variety of computer configurations, such as one machine per competing team, or one machine per student. It offers the opportunity to experience a good computer simulation and provides a rich environment for the participants to experience a set of problems that they need to solve in order to finish the simulation.

Break: Participants can take a break somewhat near the end of their run of the simulation. Remind them to adhere to the rules of the computer lab governing food near computers. No specific time need be provided for a break, as the nature of the simulation allows users to take a break at their convenience.

Debriefing: 40 minutes

The key to the first part of the debriefing is to examine the different types of interaction and problem solving employed by the participants as they worked their way through this simulation. It is important to focus on how they reacted to the software and how they went about problem solving with the software. Get the participants thinking about thinking. Through their own introspection and through the sharing of these experiences, participants should begin to generalize some problem solving methodologies. The four steps of defining a formal problem and trying to solve the problem once defined continues to play a strong role in the debriefing; however, the idea of a problem situation (a situation where one or more the the four defining components of a problem is ill-defined or completely missing) can be used. There are many ways to solve a problem but when the four components of givens, guidelines, goals, and ownership are identified then the problem solving activity has a more objective standard by which the rate and quality of progress can be monitored. Thus, in many problem solving activities the four categories provide a practical list of concepts toward which one can work. However, how any one person goes about implicitly or explicitly identifying and using each component is difficult to determine and even more difficult to judge as to its overall effectiveness in arriving at a solution. There are many ways to go about solving a problem, but the general schema identified earlier and used again in this session provides a solid conceptual structure to analyze problems. It also provides a goal toward which one may work when involved in a problem situation.

Begin the actual debriefing by asking the participants to think about how they went about playing the simulation. For example:

-How many read the directions and carefully outlined a plan?
-How many began play and used more trial and error than a careful plan?
-What kind(s) of problem solving skills did you use in working with this simulation?
-Are these skills the same as those used by your students in solving the types of social studies problems that you want them to learn how to solve?
-Do the skills we have identified carry over into other problem domains such as history, geography and so on?

The second aspect of this debriefing is to identify some of the characteristics of simulations that make them a useful classroom activity and to characterize the unique qualities that a computer brings to simulations in an educational setting. Simulations can be motivational, as they give the students a chance to involve themselves in decision making, critical thinking, active participation, procedural experiences, social and group problem solving activities. The intellectual and social skills that the students practice are useful experiences and provide strong justification in education for using simulations as individual and social problem solving activities.

Some questions to prompt discussion are:

-Why use simulations in the classroom?
-What skills do simulations teach?
-What are some of the problem solving skills that can be taught using simulations?
-What kind of social skills can a simulation provide the opportunity for students to practice or teach?

The computer brings a level of sophistication and realism that is hard for other types of simulations to develop. It can provide dynamic, real time scenarios that do not have obvious human authorship. By using random events the simulation can provide a complexity not given to the more traditional non-computer simulations and the immediate feedback can be a strong motivator to deepen the involvement of the students in the activity.

-What characteristics do computers brings to simulations?
-Do you think it is productive to use the computer as a problem solving facilitator?
-Relative to non computer simulations do you think there are significant advantages to using the computer?

One disadvantage of educational simulations is that they typically take more time on average than other classroom activities designed to cover the same content. Also, if the simulation is not a reasonable portrayal of some real world event then the simulation can be misleading and not at all appropriate for use in the classroom.

-What are the the disadvantages of simulations in general?
-Are there any special disadvantages associated with using the computer to generate simulations?

The last two or three minutes of the debrief should give a brief overview of the notion of transfer of learning. The definition given by cognitive theorists cover two ideas: near transfer and far transfer. Near transfer refers to learning that allows generalization of skills learned in one situation to tasks used in another similar situation. Far transfer refers to generalization of tasks from one situation to another very different situation. More time will be spent on discussing transfer in next week's session.

This Weeks Assignment:

Include with this week's Game of the Week a summary or some typical examples of the previous week's game of the week. Because the central themes of any game of the week is also addressed in class, little if any class time needs to be devoted to going over previous games of the week unless the participants need more direct feedback.

Logs:

1. Remind participants that logs are to be filled out each week.The logs

should be turned in, and their contents should be discussed as seems appropriate to the inservice facilitator.

2. New weekly logs should be handed out.

Closure:

1. Be positive about their contributions, and highlight their experience and expertise as classroom educators.
2. Briefly mention next week's activities on simulations and near and far transfer.
3. Next session will be using The Other Side software from Tom Snyder Productions. The session will go much better if you commission four to six people to take some of the written material about the simulation home so they can acquaint themselves with the material and serve as resource people for their groups during next week's session. If time permits, divide people into teams now, so that they can get started more quickly next week.

4.4.3 Timeline

This session will use only one piece of software. The parameters should be so set to allow the participants to finish the simulation in about 75 minutes. We suggest that you set up the simulation so that participants begin the simulation at the beginning of the fifth week of the campaign.

0:00 - 1:15	**Initial activity:** President Elect is a good simulation because it provides a number of problem solving activities and demonstrates how a computer can be used to generate a simulation that can be used in the classroom. (Note that this simulation is particularly interesting to students when an actual presidential election is just about to occur. But this simulation is sufficiently interesting that it can be used at other times.)
Break	The break during this session is informal and at a time selected by individual participants. This is due to the nature of the simulation, which in essence has built in break periods. Most people will spend the better part of an hour before they begin taking a break; thus do not encourage them to take a break until approximately the end of the first hour of the inservice.
1:15 - 1:16	**Transition**: Pull the focus away from the computer simulation and begin the debriefing by asking the participants to turn off their monitors.
1:17 - 1:55	**Debriefing:** This debriefing will cover several major ideas. The first aim is to get the participants to examine their own problem solving experiences. Then get them to generalize these experiences into the general schema used in the earlier sessions on problem solving (Givens, Guidelines, Goals, Ownership). The last half of the debriefing should examine the role of simulations in the social studies classroom. Give special emphasis to the computer and what it brings to a simulation.
1:55 - 2:00	**Closure:** This last time block will be used to discuss the term project, log sheets, and this week's assignment.

4.4.4 Handouts

The pages of this section are handout materials needed by the participants during Session 4 of the Social Studies Inservice. These materials are used by the participants as performance aids, course reference material, and as weekly assignment material. The facilitator may find it useful to make some of these into overhead projector foils for use during the inservice.

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CI^3 Social Studies Inservice President Elect Handout

Introduction:

President Elect is a computer simulation of a presidential campaign from Labor Day until Election Night. This simulation requires the participants to plan and execute campaign strategies as they seek election to the highest office in the land. Ordinarily you would enter your social, economic, and political views as a candidate, but these have already been entered into the computer for you. To start at the beginning and go through the first four weeks of the campaign would take longer than class time permits. Thus, you will begin the simulation at the beginning of week 5 in the campaign. You will be able to manage your own campaign, but the computer will manage the other two candidates. At the end of the ninth week, election returns come in until a winner is determined.

Be sure to read the information provided below before you start the simulation.

Campaign Profile:

Your name is Ferrell. You are a Democrat with somewhat liberal social views and are considered a moderate both in foreign and economic policy. You are a strong, magnetic leader with poise and a gift for oratory. You are from Illinois and are developing a strong political base in the industrial Midwest with some support in the Mid-Atlantic region due in part to your running mate who is from New York state.

Your Republican opponent is George Bush whose running mate is from Utah. Vice-President Bush is an energetic campaigner with a strong campaign organization that is making a determined effort in the South and has solid support in the Midwest and Western states. A third party candidate is Barry Commoner whose running mate is from Maine. At this stage Commoner's efforts have not proven to be a force in the election campaign.

Inflation has been running a consistent 5%, and unemployment is at 7%. In a national poll taken during the first week in October 1988, the projected votes were given for the three major candidates as follows:

Percentage of *popular vote*:

Ferrell (Democratic)	50%
Bush (Republican)	49%
Commoner (Independent)	0%

Projected *electoral votes*:

Ferrell	211
Bush	206
Commoner	0
Too close to call	121

As in all campaigns, resources are limited by monetary as well as psychological factors. Political Action Points (PAPs) represent your total available resources. Two months before the election, you had 27,300 such resource units. At the beginning of the current week, you have 14,190 PAPs left. Each week you are given enough PAPs to carry on the campaign, but you need to allocate these resources carefully, because if you do not spend your PAPs wisely, you may not have enough to take care of other campaign needs.

There are four general areas for campaign expenses:

a. *National campaign* - any amount of PAPs.
b. *Regional campaign* - up to 500 PAPs for each of six major regions.
c. *Specific expenditures for up to three states* with no more than 150 PAPs per state.
d. *Campaign stops* - It costs 45 PAPs to visiting a region, 20 PAPs for each state entered, and 35 PAPs for each campaign stop in the state. Thus, a swing through the Pacific Coast region, making one stop in Oregon, two in Washington, and three in California, will use 45 + 60 + 210 = 315 for the six stops in the three states within that region.

Strategy

Your overall strategy should be to cover the National campaign with at least 500 PAPs per week, and each of the six regional areas with 10-200 PAPs for each of the six regions based upon the political environment and number of possible electoral votes in that region. For example, only use PAPs in states that are close and/or carry large electoral votes. The most effective way to campaign is by making personal appearances (*stumping*). But your physical resources (fatigue effects will set in if you visit too many states in a week) and monetary resources are limited, so you will need to portion out both your state visits and the PAPs carefully.

Over the months, you have made steady gains in the polls. You now hold a small lead, but Bush has surged and is running a spirited and effective campaign. In recent weeks, you have campaigned in the Mid-Atlantic, Industrial Midwest, the South, and the Pacific Coast regions. This last week you finished a trip to the Soviet Union. The press coverage was good, and campaign officials are pleased at the heartfelt welcome you received on returning to the States.
Finally, Bush and Commoner are both interested in debating you, but on the advice of your best strategist, you declined their offer.

To Begin Play:

The inservice facilitators have played the simulation up to the point at which it is being given to you. You have five more weeks of campaigning before the election. Examine the screen to see the current projections. Press RETURN to continue.

The map that appears on your monitor represents each state's political inclination. Attached to this handout is a map that has been coded so you can see which states are in your camp, those that are neutral, those that are leaning toward one of the candidates, and those that appear to be in Bush's fold.

How the Republican and Democratic states are displayed on the screen may not be immediately clear. Carefully compare the attached map with the computer screen, because with the green (black and white) monitor it is not easy to tell, without some practice, which states belong to whom. (With a color monitor it is much easier.) Notice the difference between the visual texture of Illinois and Nevada or Oregon and Georgia. Compare these regions with the same regions on the attached map. This should help you see how each state's political disposition is represented on the screen. You should update the coded map or use the extra map which has been provide for you as you progress through the campaign. Press any key when you are ready to continue.

The next screen details national or international news that may affect the campaign. When it is your turn to spend PAPs, you will need to decide what to spend in the four categories outlined in the Strategy section above. Use the campaign strategy sheet that has been provided for you. Enter in column 5 and in the row labeled "PAPs Remaining" the number 4601. This number represent how much was originally allocated for this week's campaign efforts. Maintaining a national organization requires about a 1000 PAPs per week which are automatically deducted from your weekly allocation. The difference between the organizational expenses (1000) and maximum allowed PAPs for that week is 3601 (4601 -1000), which is how much you have left to spend in other areas. Use column number 5 on the campaign strategy sheet to carefully plan out your other expenditures before entering the actual amounts in the computer. (Hint: The Mid Atlantic and Industrial Midwest are your political bread and butter. It might be a good strategy to first consolidate these areas by making a few campaign visits.)

Once you have decided on the amounts to spend in each area, enter the actual figures into the computer when indicated, and press RETURN after each entry. After a short pause, the simulation will continue. If you do not want to spend any money in any category or subcategory, type 0 and press RETURN. If you make a mistake, you may correct it before you hit RETURN by using *only* the left/right arrow keys. However, after you hit RETURN you cannot correct your errors any more than you can correct bad press or some other political gaffe. However, you can avoid such gaffes by carefully outlining your expenditures on the attached campaign strategy sheet before you enter the data into the computer. After you have entered your PAPs for that week, the computer will calculate the strategy for Bush and Commoner. This part of the simulation takes about a minute to complete.

In the campaign summary phase each region will be broken down by states. The screen titled "ESTIMATED RELATIVE CAMPAIGN EFFORT" indicates the amount spent, in PAPs, by each candidate. It is important to notice the expenditures of both Bush and Commoner. This will give you some feel for where they are concentrating their efforts. This provides the *only* intelligence you will have about their campaign strategies. Also the numbers of visits made to a state by you or any of the other candidates are indicated by the inverted numbers to the right of the column of expenditures for that specific candidate. Again, as you go through each of the six regions, you can gain valuable intelligence by looking at the other candidates' expenditures and state visits. Finally, you will be ask if you want to debate. A debate by the leading candidate may not be wise, but the decision is yours. When you have finished with the week, the computer will ask if you want to continue or save the game. *Continue the game.*

At the end of the campaign, you will see some early election results. In a short time a screen will be displayed giving you several options. Choose option number 9, and go directly to the election results. If time permits reboot the system, look at the early stages of the simulation, and set up your own scenario for the candidates. If you do not know how to restart the simulation, ask one of the assistants.

Good luck. The campaign is yours to win.

Game of the Week (Session 4)

In a large sense, school is a simulation designed to help prepare students for life in the "real world" outside of school and/or after completion of schooling. As a teacher you may have a good understanding of what your students feel about how the school relates to preparing them for life outside of school. The purpose of this game is to increase your knowledge in this area.

Select several students, an entire class or several classes. Ask them:

1. Please give me one or more examples of something we have covered in class this year that is applicable in:

   a. Another class you are taking now.
   b. Something you expect to be doing or studying next year.
   c. What you expect to do as an adult.

2. Please give me a couple of ideas on how the class you are taking from me could be designed to better fit your needs along the lines of a, b, & c above.

Discuss the results. include in your discussion some typical comments or answers that students give you. Also include in your discussion any observations or thoughts you have about the relationship between what you teach and how it fits the needs of your students.

Game of the Week Outcomes

There were a wide variety of responses made by the students of the participants. A brief list of some of the comments made by the students is given below. The responses of the students have been grouped into categories. Also included is a typical response made by one of the teachers to the second part of the question.

1. Please give me one or more examples of something we have covered in class this year that is applicable in:

a. Another class you are taking now.

- writing, spelling, reading skills used in Science, Health and Math.
- PQ2R used in Science and Math
- measuring skills used in Math
- reading material and making statements about the material
- writing (essay)
- using & interpreting & making graphs
- general knowledge (for quiz bowl, etc.)

b. Something you expect to be doing or studying next year.

- Social Studies skills in US History next year
- Reading, writing, spelling skills
- Thinking skills to Science and Math
- Computers in History and Science
- geography - charts & maps
- research skills
- writing *big* reports
- paragraph writing

c. What you expect to do as an adult.

- Writing, reading, spelling skills
- Write so people can understand me
- Speeches so we can talk to groups
- Read the newspaper so we can know what is going on
- Be able to follow directions
- Using computers
- lifestyle - being physically fit - well-rounded
- archaeologist
- metrics
- general knowledge about the world
- reading the newspapers

Teacher Response:

I surveyed my advanced sixth grade math class of nineteen students, asking them questions that would give me an indication of how the school prepares them for life outside of school. Eighteen students were present the day of the survey and attempted to answer all four questions as stated in the Game of the Week write up.

In response to question No. 1 where students were asked to give one or more examples of something covered in class that would help them in another class they are now taking, eight students mentioned that studying percentage has helped them in reading graphs and charts in Social Studies. As a classroom teacher, I was hoping some students would mention graphs and charts in the newspaper, but will now spend some class time looking for such examples. One student answered that having a good understanding of percentage helps them compute their own grade point average on assignments. One other student mentioned that using percentage helped them in the Vital (Industrial Arts Area) in using something he/she referred to as the 100 grid.

All students who were surveyed saw the Math Unit on percentages as helping them in future math classes and giving them a better understanding of fractions and decimals.

When answering question number three, students tried to relate what they were learning in class to how it would meet their needs as adults. There were several interesting answers. One student saw that it would help them with bills and sales at stores. Another student saw it as helpful when working on a design with fabrics and being able to decide what amount of each fabric would be required.

Students had the most fun adapting the class to their own needs. Perhaps question number four, pertaining to how the class could best be changed to help the students transfer knowledge, was misunderstood. Answers varied from "more free-time" and "let us play football" to "let everyone work at their own pace."

I was pleased to see the amount of awareness students had of the importance of what is taught in the classroom. Certainly not all things done in the classroom have equal value for transfer. I do feel that a good understanding of percentage is of value and will have many applications for the students. They will find themselves using percentage when they read the ingredients label on a food product, read the election returns, try to understand how many of their neighbors are unemployed, etc.

4.4.5 Materials

Simulations tend to take longer to set up and complete than other types of activities typically used in the classroom. And, of course, they can require considerable work on the part of a teacher to make the necessary preparations to use a particular simulation. Certainly the teacher will want to become reasonably familiar with the simulation before using it with students. Also, the teacher will want to develop a lesson plan with considerable flexibility. (For example, what happens if the simulation is based on using just one computer in the classroom, and the computer breaks just as the class is starting?)

What follows is one lesson using the computer simulation President Elect. It was developed by a classroom teacher and used successfully with his students. Notice that this lesson is used in conjunction with other instructional tools and aids. This lesson is a good practical demonstration of how to integrate the computer into the curriculum. The President Elect simulation is used over a period of a number of class days, and it forms only part of the overall unit on presidential elections.

Description:

Topic: Elections
Grade Level: 6-12
Time: 1 week
Grouping: Divide the class into two groups.

Objectives: To experience the various aspects of the election process that the presidential aspirants may experience.

Materials:

Software: President Elect

Equipment: One or many computers compatible with the software.

Other materials: Newspapers, Classroom texts, information on the election process, biographies of political candidates, etc.

Before you start:

Cover a unit on the election process.
Divide the students into Republicans and Democrats.

Lesson: (Sequence of instructional activities)

The sequence of activities can be varied but one way to structure the simulation with the students is to cover about two election weeks on the computer for each instructional day. If one computer is being used for the whole class, the teacher can develop and maintain this pace. If there are a number of computers, the individual teams can be restricted to this pace. Other instructional materials and assignments can be used as you proceed through the simulation.

Follow up:

During the play of the simulation the students can engage in a number of additional tasks such as: clip current events about speeches and debates; follow candidates and the issues that the candidates espouse; prepare a television advertising campaign, a magazine or newspaper ad; and act as representatives to debate the issues as they feel their candidate would.

Comments:

This simulation is useful along with a text unit on elections, political parties, public opinion and persuasion. Group students into two groups that represent the Republican and Democratic parties and have them put the candidates through the election campaign trail.

While these activities go on, you can go week by week through the computer campaign, usually at the pace of two weeks per week of school instruction. At the conclusion, the text lesson on the electoral college is covered and we await the election results.

This simulation works even if you have only one computer terminal available, but the addition of a large screen monitor for class use can cause an increase in ambience of the exercise and allow a little more flexibility in the classroom environment.

Additional Comment:

There are many computer-based simulations that are useful in social studies classes. Some are easier to learn to use than others. President Elect is a rather sophisticated simulation. it takes quite a bit of time for a teacher to learn to use this simulation. Also, it takes quite a bit of time for students to get good at playing the simulation.

If you want an easier simulation to start with, consider using the Tom Snyder simulation Decisions, Decisions.

4.4.6 Readings

The "Readings" sections of this Notebook are designed to supplement the materials presented during the inservice sessions. It is appropriate to assign these readings as "homework."
One goal in an inservice such as this is to get participants more used to reading the literature. All social studies teachers should be aware of the publications that are directed at social studies educators.

The two articles listed in the bibliography are commonly available and provide a good source of information for the participants.

Bibliography

Budin, H., Taylor, R., & Kendall, D. (1987, January/February). Computers and social studies: Trends and directions. *The Social Studies, 78*, 7-12.

Carroll, C.E. (1986, Spring). Computer simulations. *Social Studies Review, 25*, 57-59.

4.5
Session 5: Another Simulation

4.5.1 Narrative Overview

The purpose of this session is to have participants experience another type of simulation. With two computer simulations under their belts, the inservice participants can carry on a "compare and contrast" discussion at the end of this current session.

As noted earlier, transfer of learning is a critical topic in all of education. It is of particular concern when one is using simulations. We are all familiar with simulations used to train airplane pilots and space shuttle pilots. Much of the research on the development and use of computer simulations in the United States has been funded by the military. They make extensive use of such simulations in the training of military personnel. They have gathered extensive evidence to support the contention that this is a cost effective approach to training of military personnel.

But the military simulations make use of very sophisticated computers. The simulations required many millions of dollars to develop. Moreover, the simulations are used in situations where it costs a lot to train a person. Consider a pilot learning to land on an aircraft carrier. Initially, there is a reasonably good chance that the pilot will crash. After a few dozen landings, the chance of crash landing is greatly reduced. If the first few dozen landings can be done on a simulator, these is a great savings in money and lives!

The issue for the relatively inexpensive and simple computer simulations available for use in schools is not so clear. These simulations are designed to run on very simple computers. Their relatively low retail price is representative of their relatively low developmental costs. Teachers have had relatively little education in how to make effective use of simulations.

Quite a bit of the focus in this session is on the notions of near and far transfer of learning. Near transfers refers to learning that allows generalization of skills learned in one situation to tasks used in another similar situation. Far transfer refers to generalization of tasks from one situation to another very different situation. As noted in the Narrative Overview of the previous session, near and far transfer are actually quite complex ideas. The nearness or farness of a transfer is dependent both on what is to be transferred and the person who is to make the transfer.

The President Elect simulation used in the previous session illustrates some of the concerns that one might have in using a simulation in a social studies classroom. The simulation allows students to design and run a presidential campaign. Why would we want to have students gain such exposure to something that they will likely never be involved in?

Since few or probably none of the students will ever be running for president of the United States, the simulation allows them a type of school-based participation in a process that they will likely never experience in the "real" world. It helps them to understand elections that they will participate in as voters.

There is the added difficulty that the President Elect simulation is a greatly simplified representation of the "real thing." Perhaps it is so far removed from reality that what students learn from the simulation is quite misleading. Such questions are easy to raise and difficult to answer. They apply equally well to the lectures, readings, and other instructional materials that make up the typical social studies course. Transfer of learning can be increased by engaging students in the discussion of these issues. Merely by talking about transfer, transfer is increased.

Simulations in general are strong on process learning and interrelationship between concepts and tasks that require repeated practice. These ideas need to be cast into the context of transfer of learning. For example, concepts learned by concrete examples serves as an aid to learning other things, but the learner can remain bound to the initial teaching examples. Thus context bound attribute examples may inhibit at some level the ability to transfer knowledge to a new situation. A student may get very good at playing a simulation game but be unable to transfer this skill to other situations. If the simulation is not particularly like the "real thing," little useful, transferable knowledge results from using the simulation.

The teacher can emphasize transfer of learning when using a simulation. Students can be engaged in discussions that help increase transfer. They can be asked to cite examples of situations to which transfer might occur. They can discuss and write about similarities and differences between the simulation and possible transfer targets. Presumably with further practice using simulations, the ability to decontextualize the experience and generalize to other settings may occur. In any event, the use of computer simulations is not a fool proof method for having students learn more, better, faster.

Organizational skills, critical thinking skills, and problem solving skills all come into play with a simulation. Practice is important in developing these skills. As a student experiences the interrelationship between concepts and their application, they can get more benefit by applying in a given context many of these skills.

Another positive aspect of a simulation is the consultative interaction that occurs between the individuals working together. The skills of give and take are strong components of a simulation. Many of the social skills needed in many situations are like the ones encountered in a simulation. Thus the near transfer of social skills seem straight forward. However, the relative near and far transfer of many of the organizational skills, critical thinking skills, problem solving skills and verbal and written communication skills is harder to ascertain.

As noted earlier the underlying assumption behind the use of simulations is that the experiences mediated by the simulations will transfer over to similar events. A key idea is that activities that provide opportunities for students to maintain and generalization certain skills learned in the classroom to real world events is a critical. It frames one of the essential aspirations of educators. Computer simulations appear to provide an instructional environment where near and far transfer can occur as well or better than by using traditional instructional methods. It is clear that the strengths the computer brings to the educational setting make it a worthwhile tool to use with simulations.

4.5.2 Script

Theme: Simulations: Near and Far Transfer

Objectives:

1. To acquaint the participants with the concepts of near and far transfer.
2. To continue to examine the use of computer based simulations in social studies education.

Abbreviations: Readers of this script and subsequent scripts should note that the following abbreviations are used.

LP—Lesson Plan
PA—Participant's Instructions
HO—Handout
OV—Overhead projector

Materials:

Software	*Handouts*
The Other Side.	PA 1
Tom Snyder Productions	Weekly Logs
	Game of the Week

Refreshments

Assumption: Participants have given some thought to near and far transfer. When asked to do so, they can provide examples of teaching techniques they use that are designed to increase transfer.

Pre-Session: **Discussion**: *The Other Side* simulation can be used with one computer used by both teams or with two computers linked together by a modem or a direct connect through each computers' game port. During the National Science Foundation project inservice session, four computers were used. One set of two computers were hooked together by a modem and the other two were hooked together by a direct connection out of the game ports.

1. Make sure all the written materials used as reference guides and worksheets are attached to the PA. Become acquainted with the simulation, so that you understand the type and number of activity worksheets needed. The documentation accompanying the simulation is excellent.
2. Place enough copies of PA 1 for each team beside their computer.
3. See that the telecommunication link on ground lines is secure (you don't want a critical link to be broken by a participant tripping over it) and each computer is linked.
4. Make sure the direct connect between the two computer systems is functioning properly.
5. Divide participants into teams of about four to five members. Each team should have at least one person who reviewed the material before the session.
6. The simulations should be set to the "cooperative mode." Participants should be informed that the simulation can be set up in different modes; different learning outcomes can be expected from use in different modes.

Get Started
90 minutes

Purpose: The purpose of this session is to experience a type of simulation that is quite a bit different from the one used in the previous session. This allows participants to compare and contrast the two simulations. The underlying theme is near and far transfer, and discussion should be oriented in that direction. As you wander around observing participants using the simulation, ask them what they are learning and how it applies to what they teach or to the "real world." Near transfers refers to learning that allows generalization of skills learned in one situations to tasks used in another similar situation. Far transfer refers to generalization of tasks from one situation to another very different situation.

Perhaps the main purpose in using the simulation *The Other Side* is to let the participants examine complex issues of conflict resolution between two teams that represent two countries. This simulation allows the participants to confront a large number of issues that are of concern to an enlightened citizenry of any country. Issues involving budgets, expenditures, resource management, crisis management, and so on reflect many of the problems confronting any nation.

Break:

The break should be taken at a convenient moment by the teams during the simulation. Encourage them to take a break after about an hour's play ,but suggest that they do not linger. In order to finish the simulation, they will need most of the hour and one-half.

Discussion:

The simulation will proceed differently for different groups so the two groups will finish at different times. (Like most simulations, one gets better with practice. Participants who have used the simulation before will proceed through it much more rapidly and with a clearer sense of direction. This "learning curve" idea can be brought up in the debriefing discussion.) Be sure that the groups are brought back together with enough time left in the session to debrief. Ordinarily it will take about 90 minutes to finish the simulation.

Debriefing:
30 minutes

The simulation exposes the participants to some of the decision making problems faced by the leader of a country. In making such decisions, leaders have to consider their resources versus their needs and the political consequences of their actions. Organizational skills, critical thinking skills, problem solving skills and verbal and written communication skills all come into play when using this simulation. Another aspect is the consultative interaction that occurs between the individuals working together. The skills of give and take are very important to doing well in using this type of simulation. Many similar social skills are needed in real world situations that are like the ones encountered with this simulation. Thus the near transfer of social skills seem straight forward. However, the relative near and far transfer of many of the organizational skills, critical thinking skills, problem solving skills and verbal and written communication skills is not so clear.

Some questions that are useful during the debriefing are as follows:

-What organizational skills are needed for this simulation?
-What are the general components of such skills that can be applied in other areas of endeavor?

-Can anyone provide an example of an organizational skill used in this simulation that involves near transfer? Far transfer?

The same line of questioning can be used to cover the critical thinking, communication, and problem solving skills used in this simulation to look for practical connection between the ideas involved in near and far transfer.

In general, simulations are strong on process learning and interrelationship between concepts and tasks that require repeated practice. These ideas need to be cast into the context of transfer of learning. For example, concepts learned by concrete examples serves as an aid to learning other things, but the learner can remain bound to the initial teaching examples. Thus learning the process may be very important to the transfer of learning in a situation. Allowing the students to experience the interrelationship between concepts and being able to repeat aspects of that experience facilitate the practice of the underlying processes of decision making.

Exposure to a wide variety of examples across a variety of contexts may improve transfer. A number of studies indicate that students trained in a particular problem solving strategy generally out perform students who have not learned such a strategy. For example, one powerful problem-solving strategy is to "draw a picture." Students in mathematics who learn this strategy will out perform students who do not have this strategy in their repertoire. Simulations can provide appropriate practice opportunities for students to gain skill in using a particular strategy.

Some of the debrief questions on these issues are:

-Students learn a lot of concrete examples; how do we get them to generalize from these concrete examples?
-How can using the computer help the students transfer knowledge for the computer environment to other environments?

It time permits, the debriefing can raise the question of similarities and differences between last week's simulation and this week's simulation. Which was easier to learn how to use, easier to use, more relevant to the social studies curriculum, and so on?

This Weeks Assignment: See Game of the Week; also have them turn in last weeks Game of the Week. Provide a summary or some typical examples of last weeks Game of the Week results.

Logs: Logs are to be filled out each week.
1. The logs should be turned in.
2. New weekly logs should be handed out.

Closure:
1. Review next week's activities.
2. Pass out any reading material.

4.5.3 Timeline

This session uses *The Other Side*, a computer simulation. Workshop participants are divided into teams, with about four members per team. There are a variety of ways of arranging the computers. For example, a pair of computers can directly cabled together or can be connected by modem and telephone line.

The simulation takes quite a bit of time. Have everything set up and ready to go when participants arrive.

0:00 - 1:30 **Initial activity:** This simulation will give the participants a chance to experience and make use of a number of skills that apply to a wide variety of life settings. The near and far transfer concepts are important. These concepts are critical concepts that can be associated with simulations (and other activities). Make sure all the equipment is set up and functional. Have the PA 1 and support worksheets for the simulation placed beside each computer with enough copies for each participant.

Break: The break during this session is informal and not scheduled for a specific time; and most will take their break after the first hour. The intent is that participants will continue their active involvement with the simulation for about 90 minutes and take a break at their leisure sometime during the 90 minutes. Participants should be told in advance that they will only have 90 minutes. They will want to take this time limit into consideration as they develop and implement their strategy in the simulation.

1:30 - 1:55 **Debriefing:** This debriefing will focus on a compare and contrast between *The Other Side* and *President Elect* simulations, and it should pay particular attention to near and far transfer of learning. The facilitator will draw out the ideas of near and far transfer that seem relevant to the participants, and note that not all participants will agree on what is near and what is far. The participants will be directed to discuss the skills that are important to teach that might be well taught through use of simulations.

1:55 - 2:00 **Closure:** This last time block will be used to discuss the Game of the Week, log sheets, this week's assignment, and other details of the inservice series.

4.5.4 Handouts

The pages of this section are handout materials needed by the participants during Session 6 of the Social Studies Inservice. These materials are used by the participants as performance aids, course reference material, and as weekly assignment material. The facilitator may find it useful to make some of these into overhead projector foils for use during the inservice.

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CI ^{3} Social Studies Week 5
Handout#1: Introduction

1. In today's session we will be doing a group activity. This activity will center around *The Other Side*, which is "A Geopolitical Simulation: Solving the World's Number One Problem." Your task is to build a bridge between two countries. You can think of "bridge" as being metaphorical. Generally speaking, it is going to take cooperation to build a bridge.

2. For your convenience, the program has been set up ahead of time and is ready for use. **Please do not** press any keys on the keyboard until you have read through these directions and understand your role in this simulation. You will be working in a group. Team work is very important, so assign tasks carefully. *Each team will start the simulation at the same time.*

3. One member of the group has read the instruction booklet before hand and should have some knowledge of the simulation. Each participant, however, has all the essential information in the worksheets attached to these guidelines. If you are waiting for the group to form, you may want to practice with **The Planning Code**. (This is a very important skill, and one of your group members should master it early on.)

GAME PLAY HINTS:

Send out patrols first, starting with the area around your capital. When you find resources, send drillers to tap the resource. You need resources to get money to build a bridge and for other activities.

You get money by mixing fuel. Do not use (sell) mix fuel unless you need the money. However, if your money gets too low, the C.A.D. (Computer Assisted Defense) will take over and start making decisions for you (not a good idea). Read up on the C.A.D. (see manual); it can be a real pain!

Keep careful records using the maps and other materials supplied to you. Drill first in areas that have high blue fuel, but drill in any area that has green or orange fuel. By mixing all three fuels you make the most money.

Pay particular attention to the Costs and Values listing on the Resource Manager's sheet.

To begin building the bridge, inspect Area 28. Note: you cannot place a possession there!

Divide your team up so that each of you will take on the role of one of the following: Keyboard Operator, Map Manager, Resource Manager, Yearly Planner, or Team Leader. (If your team is small, one person may need to take on two roles.)

The role descriptions are as follows:

KEYBOARD OPERATOR: Types in the game commands and Hotline messages. Needs to be familiar with the commands, so refer to the Reference Card and The Planning Code worksheet.

MAP MANAGER: Keeps track of the location of fuel, patrols, drillers, and bombs on the map/gameboard. This person will need to keep careful records.

RESOURCE MANAGER: Records information on the amount of fuel in the tanks, condition of the tanks, level of contamination, and amount of cash in budget for each year. Uses the Resource Manager sheet to organize the information. You should assign one person for each fuel tank to monitor the information.

YEARLY PLANNER: Records Hotline messages and plans the codes for each year's moves on the Yearly Planner sheet.

TEAM LEADER: Coordinates the activities of the group. It is a good strategy to assign this person to be the egg-head, researching (using the manual) to answer any questions the group may have.

4. Read Steps 1-4 on pages 12-14 of the Student Guide. You will be playing a collaborative game.
5. It has been decided ahead of time whether you are the Left or the Right side. The Left side will go first. (Note: going first does not give an advantage to either side.) If you are the Right side, your turn will be when you see the message, "The Right side's turn...," on the computer screen. When the game begins, things start happening fast, so organization is the key to a successful venture.
6. If you have any questions during the simulation, please ask one of the inservice facilitators.

Game of the Week (Session 5)

This week you have a choice between activities. Please respond to one of the following:

1. Think of a non-computer simulation you have used with your students in the past. Describe the simulation, the intended outcomes, the actual outcomes, and other relevant information about your experience in using the simulation. How are the set of experiences a student gets from a computer simulation, like those you experienced in the inservice, different than those experiences a student gets from using a non-computer simulation? How has this changed your view about using simulations in the social studies classroom?

2. In last week's and this week's sessions we talked about the near and far transfer of school-based learning to applications outside of the classroom in which the initial learning occurs. The applications may occur in another class, on the school ground, at home, at work, etc. What are some of the things that you do in your class that increase transfer of learning in one setting to that of another setting. Support your discussion with some specific examples from a subject you are currently teaching. (Think of this as writing a short paper to instruct beginning social studies teachers on things that they can do that will increase transfer. Your recommendations should be strongly rooted in your own personal experiences.)

Results of the Game of the Week (Week 5)

The social studies teachers reported that the use of computer simulations is an improvement over use of non-computer simulations. The transfer of learning issues is much more complex and the teachers comments ranged from very confident that some transfer occurs to other contexts to one teacher who reflected that little if any transfer occurs. But the interdisciplinary approach to teaching is supported by many of the teachers because they believe that transfer can occur more easily from the type of educational environment generated by simulations.

Several responses from the teachers are given below; they are elegant testimony to the use of computer and non-computer simulations.

A Middle School teacher's response:

The non-computer simulation that I have conducted with students is called Fur Trapper. The simulation requires students to actively attempt to increase their worth by trading in a simulated late 19th century wild west economy. The learning experiences that the students were expected to learn compared to a computer exercise were not much different.

First of all, students in a simulation must be actively involved. With a computer exercise the monitoring of participation might be a little harder to check. Next, the students in a computer exercise have to understand that the results of interaction that the computer processes can be done more fairly than if it were being facilitated by a human. Each time the computer simulation is conducted it is done "fairly." Finally, the results of a computer simulation can be more predictable than a free-form simulation.

Simulations, whether they are human driven or computer driven, take time to put together, conduct, and debrief. If you have time to accomplish all three, then they can be very valuable.

Another Middle School teacher's response:

1. Experiences from Simulations:

Basically the experiences gained in a computer simulation are about the same as those in the non-computer simulation. The basic differences are that with the computer based simulation, if you have several computers available, you can run groups at different rates of speed, and there is a little more flexibility, as well as the "technological mystique" associated with the using of a computer. In the non-computer simulation, the whole class basically must be ready to do their "thing" at the same time. For example, in a farming simulation I have, the kids all must have their planting plans finished before I can tell them the results for the year. In computer simulations, the computer can do the math required, whereas in the paper simulations, the kids must do the math themselves.

This really hasn't changed my view about using simulations. It has just increased my desire to be able to convert some of my "paper" simulations to computer simulations. It has also increased my frustrations, because my computer programming experience is so limited, and because as a "safety net" school there aren't any funds available to purchase good simulations. [Editor's Note: In Oregon, the state legislature passed a "safety net" bill. It provides for a rather minimal operating budget for a school district whose budget gets defeated repeatedly by the local tax payers. In most of Oregon's school districts, about two-thirds of the funding comes from local property taxes, and the tax payers often vote on these taxes yearly.]

With the ease of use and more individualization possible with a computer, I think more kids could get more out of a simulation than using a strictly "paper" version.

A High School teacher reports:

Simulation: Power Simulation
Number of countries: 3 - 5
Number of countries played per class: 1
Summary: A global power simulation. Each hypothetical country is assigned a role and given a GNP and an annual GNP income that reflects the sizes of two major super powers. Each country has three ways to budget its money (Save & do nothing, invest in domestic growth, or spend on military build-up). Separate classes each represent different hypothetical countries; each has a group of decision-makers and a group of validators. Students create their country—its resources, heritage, trade partners, flag, etc. Once it is started, it takes about 12 minutes of class time per day. Students learn the next day from myself how the others spent their money. It frequently leads to an arms race. After the simulation is underway, the most important part is the "debriefing" that follows each session and includes discussions of how and why they spent their money.

Differences:

Conventional simulations—

1. Allow face-to-face interaction by the students; something I feel is a high priority in educational activities.
2. Students have to cooperate more closely.
3. Emotions and reactions to created situation have to be dealt with on the spot.
4. Students have to analyze their group reactions to how and why they spent their country's money. The interactive human element is very pronounced.
5. Students get very involved - almost too involved for some classroom environments. They can become a disturbance to other classes in the building.

Computer simulations—

1. Create more objective actions by the students. Students seem to remain more detached from the consequences of their actions taken in the simulation.
2. Students are much quieter, which pleases other teachers and principals.
3. Students act on the basis of the specific information and directions provided by the computer program.
4. Consequences of decisions made are not thoroughly experienced by the students. Moral and ethical issues that involve "right" and "wrong" are more difficult to illustrate to the student.
5. Accuracy of data gathered and thoroughness of research is more effectively illustrated to the student.
6. There is less setup time; the simulation moves quickly and is more quickly grasped by the student. The effect is to grab the students' interest sooner.
7. Computer simulations seem to suggest a beginning and an end to a given set of situations. There is frequently an outcome such as to "win" or "lose" which does not necessarily reflect "real" social issues.

How has this affected my view about using simulations in the social studies classroom? I will continue to use simulations as they seem to be appropriate for a particular classroom situation. These are limited by the kind of classroom environment I am faced with. In some instances one may be preferred over another. I believe the "Power Simulation" I have described could be enhanced by a good data bank and a little teacher creativity. I would not want to rely totally on a computer simulation, but it can be added as a tool that can make a simulation more realistic by allowing the student to retrieve information more quickly. At this time I have not seen a program that would allow me to do this.

The program we used in class has some limited value and could be used but would lack the kind of face-to-face decision-making that conventional simulations allow. I would use it to emphasize the need for accurate information gathering.

4.5.5 Materials

The simulation used in this session has extensive documentation and activity sheets. These materials have been widely used in educational settings and include many good ideas on their.

The purchaser of a classroom package of these materials is granted permission to copy the activity sheets for classroom use. For that reason, none of the support material is given in this section of the Notebook.

4.5.6 Readings

The "Readings" sections of this Notebook are designed to supplement the materials presented during the inservice sessions. It is appropriate to assign these readings as "homework." The article addresses the future of computers in education. Following the article is a short bibliography of other reading material.

The Future of Computers in Education

Dave Moursund

(From EDITOR'S MESSAGE in *The Computing Teacher*, August/September, 1986.)

During the past year I have given a number of talks on the future of computers in education. These are fun to give, partly because many members of the audience feel some personal involvement in the rapid progress that has occurred and is likely to continue.

Recently I organized my "Futures" presentation in to a paper for a conference proceedings. I wrote about the past, present and future of hardware. There the progress has been nearly unbelievable, and rapid progress will continue. I wrote about systems and applications software. Progress has been steady, and continued steady progress seems inevitable. I wrote about progress in telecommunications and networking, and the rosy future of these fields. I wrote about computer science, which is slowly maturing into a solid academic discipline. I addressed computers in education, using a variant of the "Tutor, Tool, Tutee" model developed by Robert Taylor. I wrote about teacher training and instructional support materials.

As the paper got longer and more complex, I began to ask myself if all of the length and complexity were necessary. "Why can't I capture the essence of the future of computers in education in a few paragraphs, written so that all educators can understand?' All educators already understand the importance of information and how one processes information to solve problems. A computer is merely a very fast machine designed to aid in the storage and processing of information.

With this simple model of computers in mind, the future of computers in education is easy to represent. One begins with a few observations about the importance of accessing and making use of (that is, processing) information. The basics of education (reading, writing, arithmetic, speaking, listening) are all concerned with accessing and processing information. Thus, any aids to this endeavor are potentially quite important to education.

Next one points out a couple of things that all educators know. First, if you want a student to learn to use a tool, you give specific instruction in its use and you provide an environment in which the tool will be routinely used. Second, tools (such as paper, pencil and book) shape thought processes. That is, one's whole way of working with intellectual problems is intertwined with the intellectual tools one uses.

The next step is to point out four rather obvious facts about computers.

1. Computers are useful components in many manufactured **products** (cars, microwave ovens, wrist watches), and such use will continue to increase.

2. Computers are a useful aid to **productivity** (office workers, engineers, factory automation), and such use will continue to increase.

3. The cost of a given amount of compute **power** (raw CPU speed and primary memory) continues to decline because of progress in integrated circuitry technology.

4. Computers are making information more accessible, and are increasingly helping people process information to solve intellectual **problems**.

Finally, one states several conclusions that are probably self-evident.

1. Eventually almost all students in this country will grow up in a computer-rich environment, having easy access to very powerful computers both at school and at home.

2. The content of the curriculum will need to adjust to take into consideration the changing capabilities of students who have grown up with computers.

3. Use of computer-assisted instruction will grow steadily.

4. Educators will need to adjust to the changing curriculum, instructional environment and students.

A few closing remarks complete the presentation. For example, one might make a prediction that computers-in-schools' progress during the next 15 years will be many times what it has been in the past 15 years. Or one might point out the need for more money and more teacher training to help us achieve the full potential that computers offer in education.

Three things strike me as particularly interesting about this presentation. First, I will be able to use the same paper five or 10 years from now, making only a few changes to reflect some details of technological progress! Second, the presentation has a relatively low level of high-tech ideas and terminology. An educator doesn't need to have taken a computer course, or even used a computer, to follow the general ideas being discussed. Third, relatively few educators are strongly involved in changing their current educational behaviors in a manner consistent with the future being predicted. That is, computers have had relatively little impact on the content or pedagogy of the conventional curriculum. To a very large extent, computers have been an add-on part of our school curriculum.

For me, this analysis identifies the key issue for the future of computers in education. If computers remain mainly an add-on part of the curriculum, they will continue to have relatively little impact or significance. When computers are integrated into the everyday content and pedagogy of the ordinary classroom, education will have moved into the information era. The key to this is integration of appropriate information-oriented problem solving ideas and processes into the regular curriculum. Eventually every teacher will need to be involved. Are *you* involved *now?*

This is a short bibliography of other articles that may be useful in the inservice sessions.

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4.6

Session 6: Teacher Productivity Tools

4.6.1 Narrative Overview

The human mind is a wonderful thing. Our ability to learn, to remember, and to make use of our knowledge is truly astonishing. However, there are severe limitations. For most people, learning is quite slow. (How long do you think it would take you to memorize the contents of a full length book?) Moreover, the active, short term memory of a human is quite limited. Thus, from early on, humans have worked to develop memory aids. One way to study human intellectual progress over the ages is to study progress in developing aids to the mind. It is clear that computers represent a significant step along this developmental path.

Petroglyphs, hieroglyphics, and other forms of writing are external memory aids. The Gutenberg printing press spawned a revolution in the way people dealt with their world. If one places in context the European generation preceding the printing press, it becomes apparent the revolutionary effect the device had on the generations to come. As little as a century later a large number of different books were becoming common place and it is probably no coincidence that the scientific revolution began less than a century after the invention of the printing press. Interestingly, press runs on these early books were generally quite small, averaging well under a thousand copies. It is only in more recent times that hundreds of thousands or even millions of copies of a book are printed. Initially books were quite expensive. Even in the mid 1800s in the United States, relatively few people owned more than a half dozen books. (Remember the stories of Abe Lincoln?) The printing industry has made substantial progress since the invention of the Gutenberg press.

In like manner, computer use in the industrial world gives every evidence that it will exert as great an influence as the printing press. And like the machines of the industrial era that became a substitute for physical labor, the information age has spawned the computer that has become both a memory enhancer and an enhancer of human reasoning power. For example, the computer's capacity to allow us to use it as a practical tool has revolutionized the market and work place. Secretaries, accountants, engineers and many others are quick to verify that the computer is an indispensable aid in their jobs. Similarly, as teachers become acquainted with the various ways the computer can be used in helping them in their professional activities, they too testify that the computer is an indispensable aid in their work.

The computer provides a plethora of functional uses both inside and outside the classroom. It can be used by the teacher as he or she prepares lessons, manages grades [and other student data], prepares classroom displays, develops instructional overheads, and generates test masters. In this session we give the participants an opportunity to explore some of these functional activities that support the teacher as he or she prepares lessons and instructional activities. Although the inservice provider debriefs in the accustomed format, the types of responses will be more utilitarian and practical. Often the responses will center around anecdotal events involving application skills and activities and less with higher order thinking skills associated with certain forms of problem solving and critical thinking. But the central concept should not be lost; as the teachers begin to use the computer, time is freed up to work on other things.

The analogy of the printing press and computers is fun to explore. The exploration becomes somewhat confused as we think about how the two fields are beginning to merge. More and more "printing" is done in computer readable form. The whole idea of hypertext is dependent on having computers readily available. It seems clear that the changes that computers will bring are just beginning to happen!

Inservice providers are divided as to how much emphasis should be placed on computer tools to enhance teacher productivity (the computer utilities discussed in this session) and how much emphasis to place on computer applications that students will learn to use. Surprisingly, there is little research emphasis to help decide the issue. The overall goal is to improve education. One can argue that if the teacher is happier and more productive on tasks such as dealing with gradebooks, exams, and handouts, the schools will be better. Or, one can argue that the goal is to modify the curriculum so that it appropriately reflects the capabilities and limitations of the computer as a tool, and that anything less than this does not make a significant contribution to improving schools. The authors of this book tend to more strongly support this latter argument. However, they recognize the value of getting teachers started into the computer field by providing appropriate computer utilities.

4.6.2 Script

Theme

Teacher Productivity Tools

Objectives

1. Provide the participants with an opportunity to see how the computer can be used to enhance teacher productivity.
2. To examine some characteristics of a good piece of software.
3. To give the participants a positive experience in using a computer in tasks that they often perform without the use of a computer.

Materials

Software	***Handouts***
The J & S GradeBook	PA #1
The TimeLiner	PA #2
	Weekly Logs

Refreshments

Assumptions

Teachers have a good understanding of how they use their time. They are aware that quite a bit of time is used up in rather mechanical tasks, and that computers may be useful aids to increasing their productivity in performing these tasks.

Pre-Session

Make sure that the computers have been booted with the gradebook program and copies of PA #1 are beside the computers.

Purpose

This activity is to familiarize the participants with gradebook program. It will give them a concrete example of how the computer can be used to remove some of the tedium from their daily work. It provides a way for them to increase their productivity by generating grades and reports much easier. Note: Teachers often decide to use a computerized gradebook in order to save time. What usually happens is that they do not save time. However, they are able to provide better reports to students. Also, they are able to complete their grade reporting faster at the end of a grading period.

Activity
45 minutes

Gradebook programs vary substantially in quality and in the amount of time it takes to learn how to use them. The goal here is exposure, rather than mastery. Participants will become familiar with some of the features of one particular gradebook program. If they select this program for their own personal use, they will eventually master the features that they use frequently.

As soon as participants begin to get started learning to use the gradebook program, suggest that a cooperative learning approach might be useful. Likely some of the participants will have used other gradebook programs, and they may well be able to help their partners learn about this particular program. Also, encourage discussion about good and bad features of the gradebook program. Each teacher has his or her own ideas on how a gradebook should be designed and what types of data needs to be entered into a gradebook. Instead of debriefing immediately after their computer hands-on activity, schedule the break at the end of the hands-on session. Ask participants to remove the gradebook software from their computers before going on their break.

Break
10 Minutes

During the break load the *Timeliner* program into the computers and turn off their monitors. As participants return from their break, tell them not to bother with their computers, but rather turn their attention to the inservice provider so you can debrief the gradebook program.

Debrief
15 minutes

Most likely, most of the discussion will center on the utility of the software. Begin by getting the participants to talk about their experiences in exploring the software and beginning to learn how to use it. In doing so be attentive to those characteristics of the software that provide ease of use as well as functionality.

Was the booklet easy to use?
Was it readable?
Were the examples used in the book applicable?
Did you think of desirable features that were not provided?

Before you go into the utility of the software, attempt to have participants come to a consensus about what makes a piece of software easy to use. Often a piece of software is easy to use because the directions and examples are clear. Secondly, the commands to use the software are well thought out; the screen format makes the information easy to read and the software commands make the information easy to manipulate. While the booklet (external documentation) should be consistent with the material, it should contain all the information necessary to run the program and of necessity be very thorough in its coverage. Only a highly distilled version of the directions or "help option" should be on the disk.

What makes a program easy to use?
Is the quality of the external documentation important, or should most of the information be on the disk?

Some of the participants may believe that having gradebook information stored on a disk is less secure than having it in a printed (hard copy) format. Most teachers who use a gradebook program use it to print out the appropriate files from time to time, so that they have hard copy available.

A key idea to draw out during the debriefing is that much of the summary work and report generation on student progress can be handled by a good gradebook program. It takes quite a bit of effort to learn to use a sophisticated gradebook program. Also, it generally takes as much time to enter data into a gradebook program as it does to enter data by hand into a traditional gradebook program. If any time is saved in the overall process of using a computer gradebook, it is in preparing detailed reports for students and/or at the end of the term. (But most teachers just don't do this if the work has to be done by hand.)

Would use of this program make things easier for you?
How does it make things easier?
Should it replace the old paper and pencil gradebook system?

The ease with which teachers, using a computer, can manage the details associated with maintaining grades is the most important concept to bring out and reinforce. Just as in business and industry, increased productivity in one area allows time and energy to be better used in other areas. The savings in time and energy can be redirected to the students. The types of things the computer can do better than people are the things better left to the computer.

Set up

During the break place copies of Performance Aid # 2 next to the computers and boot up the *TimeLiner* program.

Purpose

This activity is used to illustrate how the teacher can use a piece of software to produce visual aids for their students. Also, the students can use this same program. Like word processing, it is both a productivity tool for the teacher and an educational program to be used by students.

Activity
25 Minutes

The program documentation is very well done. The PA is tailored to work with the booklet. One of the examples the participants work through is a timeline that illustrates the chronology of the various wars engaging the colonists, and the social and legislative activities of the colonists during the 18th century.

Debrief
15 minutes

The debriefing should center around the 18th century time line discussed above. Begin with how it provides the teacher with a quick way to generate a learning aid to be used with a unit on the 18th century military, social, and political events in the lives of the colonists.

Would such a poster be an effective visual aid to a lesson?
Was it easy to generate?
Is it easy to change?
Would such a poster work in other areas of the social studies?

Point out to participants that this same piece of software can be used by students. Students using the software can learn a number of different organizational skills and benefit from the concrete activities associated with collating the information, ordering, and presenting it. During this portion of the debriefing, focus on the social and conceptual skills that the students can learn and practice.

What are the benefits of having students use the software?
What are the social skills students practice when they use the software with a group of students?
What are some of the organizational/intellectual skills that come to play when the students use this software?

As you close the debriefing, it is important for participants to synthesize their experiences. Make explicit the concept that what the computer can do better than people is often best left to the computer. In so doing, it may free us up to spend more time on the higher order tasks that the computer cannot do.

Closure
10 Minutes

Take care of the various house keeping options.
Reserve a few minutes to discuss their projects (due next week).
Introduce next week's graphing activities.

This Weeks Assignment

Have participants turn in the work they have done on the Game of the Week. Because their projects are due next week, there is not a Game of the Week for the coming week.

Logs	Logs are to be filled out each week. 1. The logs should be turned in. 2. New weekly logs should be handed out.

4.6.3 Timeline

This is a timeline for the sixth inservice session based on the materials in 4.6.2. As with all of the sessions, there is never enough time to do all that you would like. Thus, be sure that the machines are set up and the software is ready to run as participants come into the room.

0:00 - 0:45	**Initial activity:** This activity is to familiarize the participants with a gradebook program. This will give them a concrete example of how the computer can be used to remove some of the tedium from their daily work. Note that a gradebook program does not necessarily save time. Instead, it may allow the teacher to provide more detailed and more timely reports to students and parents.
0:45 - 0:55	**Break:** During the break set up the *Timeliner* program and turn off their monitors. As participants return from their break, tell them not to bother with their computers, but rather turn their attention to the inservice provider so you can talk with them about the gradebook program.
0:55 - 1:10	**Debriefing**: The debriefing should focus how how the computer can help teachers increase their productivity by using the computer to store gradebook data and generate required or optional reports. The time saved can be used to enhance their lessons or work with students.
1:10 - 1:35	**Activity:** The *TimeLiner* activity is used to illustrate how the teacher can use a piece of software to produce visual aids for their students. Also the students can use this same program. Like word processing, it is both a productivity tool for the teacher and an educational tool to be used by the students.
1:35 - 1:50	**Debriefing:** The debriefing should center around the 18th century time line. Begin the discussion by focusing on how it provides the teacher with a quick way to generate a learning aid to be used with a unit on the 18th century military, social, and political events in the lives of the colonists. End the debriefing by focusing on some educational benefits of letting the students generate their own posters.
1:50 - 2:00	**Closure**: Take care of the various house keeping options. Reserve a few minutes to discuss their projects that are due next week. Introduce next week's graphing activities.

4.6.4 Handouts

The pages of this section are handout materials needed by the participants during Session 6 of the Social Studies Inservice. These materials are used by the participants as performance aids, course reference material, and as weekly assignment material. The facilitator may find it useful to make some of these into overhead projector foils for use during the inservice.

Index to Handouts	**Page**
CI^3 Social Studies Inservice: Gradebook	2
CI^3 Social Studies Inservice: Timeliner Handout	3

CI^3 Social Studies Inservice: Gradebook

The purpose of this activity is to introduce you to an electronic gradebook.

1. Take out the disk at the front of the yellow binder. Place the disk titled *THE J & S GRADE BOOK* in disk drive # 1 (typically the drive on the left or the drive on top, if they are stacked). Be sure to close the drive door. The other disk in the binder will be used in the second drive. Later, the program will ask for this disk, but for now leave it in the binder.

2. Turn the computer and monitor on.

3. Press any key to continue.

4. Choose option # 2 for your setup. You will need to press **RETURN** after each entry.

5. At the MENU screen, choose option #4, and press **RETURN**. Choose option # 2, and press **RETURN**. Enter the current date. After pressing **RETURN**, you will return to the MENU. Choose option # 3, and press **RETURN**.

6. The Class Data Disk is in the yellow binder. Place it in the empty disk drive, and close the drive door. Press any key to continue.

7. After a few moments, you will see the screen titled MAIN MENU. You will need to turn to page # 4 in the manual. Start at the paragraph that begins with " When finished...".

8. The rest of this activity is somewhat open ended. We have already provided two class lists: American History and Geography. Each class has five students in it, and each student has two grades entered for each class. Explore the various options as the manual suggests. Note: We have assigned a random number to the student I.D. Codes.

The data on the disk is **not important**, so add to the data or delete data as you explore the various options provided in this grade book program. ***Remember the purpose of this exercise is to explore and get to know this piece of software.***

Note to inservice facilitators who are making use of this Notebook: The particular choice of a gradebook program and the setting up of several sample class lists is left up to you. If you are already using an electronic gradebook, you may want to make use of data that represents your own students.

CI^3 Social Studies Inservice: Timeliner Handout

The purpose of this activity is to introduce you to a teaching tool called *Timeliner*. If you need help, ask one of the inservice facilitators.

1. Read pages 4 and 5 of the Manual.
2. Boot up the computer with the *Timeliner* disk.
3. Select **L** ("Load a timeline from the disk"). Choose any one of the files listed.
4. Use the left and right arrow keys to move along the timeline. Experiment with options **C** (Compress), **X** (Expand), **A** (Add), **D** (Delete), and **E** (Edit).
5. When you have finished, press **ESC.** You do ***not*** want to save any changes so type **Y** (Quit without saving changes?).
6. Experiment with the merge option (**M**) by merging the Europe file with the Colonization file. When you have finished, press **ESC.** Again, you will quit without saving any changes.
7. Refer to steps 8 and 9 on page 10 of the manual. Then follow the directions for "Building Your Time Line" on pages 10-12 of the manual.
8. Using pages 26-27 of the manual as a guide, create your own timeline.
9. Think about how you might be able to use this program in your own classroom. Is this program of value to you? Think about your curriculum. What topics lend themselves to a timeline program?
10. Due to time restraints, the printing of your timelines is not possible. Please take a minute or two to look at the sample timelines that have been printed out ahead of time.

4.6.5 Materials

Because the group projects are due during the seventh session, there is no Game of the Week for this week. Some of the inservice participants may be developing lesson plans that they will want to share. The Lesson Plan Template given below can be used to create some uniformity in format of these lesson plans.

Lesson Plan Template

Description:

Materials:

Topic:
Grade Level:
Time:
Grouping:
Objectives:

Software:

Equipment:

Other materials:

Before you start:

Lesson: (Sequence of instructional activities)

Follow up:

Comments:

4.6.6 Readings

The "Readings" section of this Notebook is designed to supplement the materials presented during the inservice sessions. It is appropriate to assign these readings as "homework." This collection of references center around teacher productivity tools or utilities.

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Beyond Merlin and His Magic Staff

by Susan Whisenand

The following article is excerpted from a packet of activities designed for use with **FrEdWriter**, *a public domain word processing program.*

Computers process not only words, but thoughts and ideas in ways that seem almost magical. Paragraphs, sentences and words shift, move, disappear and reappear with a rapidity that is astounding to the human mind. Magical though it seems, it is within the power of the magician, the writer, to bring about tricks that would make old Merlin stand in awe.

In Search of Young Merlins

Merlin spent many hours in caves, creating mysterious effects and studying ancient tomes. Today that experience can be compared to prewriting as a young learner takes the first steps in the quest to discover where the computer will prove most important in the writing process. If the writing process is examined with the focus on the effective use of computers in writing, a system for creating young Merlins with powerful magic can emerge.

Computer Prewriting

Students make lists, brainstorm ideas, create sentences, and expand on concepts by drawing, painting, coloring, and etching onto the screen their thoughts. Files become recipes, eliciting divergent responses and expanding creativity.

Keyboarding is a problem for the novice typist, but if the expectation is not perfection, then the joy of discovery can develop. Fortunately, several good keyboarding programs are currently available that are appropriate for students at the fourth grade level or up. Ideas may be dictated to adults, older students or better typists.

Computer Writing

Using interesting ideas from journals and other sources, thoughts are entered into the computer. Work developed from clusters or prompts begins to become a piece of writing. Text can be typed individually or with a partner or helper who knows how to type.

Computer Responding

Now the true power of the young learner begins to emerge. With print-outs, cursor movement, flexibility of change, insertion and deletion, the computer invites the child to play round with old ideas to make them better. If changes are made that the writer doesn't like, out they go. If changes make the writing better, they can be saved permanently or at least until the child wishes to change them again. Young magicians meet and respond to each other's magic touches to the written piece, making suggestions for improvements which do not involve the painful task of of rewriting the work over again in handwriting. Teachers and other adults are asked to make suggestions that children now want to hear, because they do want to make their work better and closer to the original purpose for writing.

Computer Revision

The writer uses suggestions to make changes; text is moved around, and new ideas are added and/or eliminated. The writer strives for clarity of purpose in communicating his real intention or point of view. The cursor zips around; the delete, insert, and move functions come alive, and the piece begins to take on its final form.

Computer Editing

Computer and human power combine to give the young writer a chance for excellence. Teachers, parents and fellow students provide assistance in pointing out spelling, grammatical and punctuation errors. Again the cursor flashes onto the scene and, obeying its young master, corrects all the mistakes, making the writing ready for publication. All children at this point deserve and need a human helper. It's hard to proof read at any age to find errors, especially if one doesn't know where to look.

Computer Evaluation

There are programs that analyze text for a variety of purposes. They look for certain types of words or phrase combinations. Some ask, through a prompt, for the student to enter appropriate text. The student is then required to respond to the text through a series of leading leading questions which may lead to rewriting. An excellent way to help students to evaluate their work is to have them print the work out double or triple spaced and to reread it for specific purposes, i.e., content, style, interest, spelling or grammar. The computer does not replace the human evaluator, it only acts as an assistant.

Computer Publishing

Student work deserves recognition. Bulletin board displays, letters and stories sent over modems, anthologies, parent letters, school newspapers, poems, books, book fairs and oral readings provide opportunities for commending young writers. Works can be illustrated with borders from software such as *Print Shop* or other clip art programs.

Getting at the Art of Writing

"Dream Focus" is an activity taken from *Beyond Merlin and His Magic Staff*. the activities in this packet are designed to promote writing as an integral part of the art and science of communication. It is hoped the student pages along with the suggestions for teachers will promote writing experiences involving cooperative learning and will reach across the curriculum. If students are freed from the belief that a finished piece of writing is done in 20 minutes and can understand that writing is a process and an art form, the purpose of this packet will be accomplished.

Background

In 1983, California AB 2190 provided initial funding for the Goleta Union School District to develop a model inservice program in writing and problem solving using computers.

The purpose of this project was to train teachers by using district teachers who had expertise in writing and problem solving due to their environment with the South Coast Writing Project and the Tri County Math Project. Preparation for these staff development programs resulted in the development of model lesson ideas for using the computer in writing and problem solving. The activities given in *Beyond Merlin and His Magic Staff* focus on the writing process. For more information on the packet, contact Judy Connors, Goleta Union School District, 401 North Fairview Ave., Goleta, CA 93117.

A *FrEdWriter* data disk of prompts for each activity in Beyond Merlin and His Magic Staff is available from SOFTSWAP. *FrEdWriter* is a public domain word processing program that is also available from SOFTSWAP catalog; send $1 to Bruce Fleury, 3225 Petunia Ct., San Diego, CA 92117.

4.7

Session 7: Graphing to Represent Data

4.7.1 Narrative Overview

The human brain and visual system have amazing capability. A teacher can glance at a room full of active students, and immediately spot inappropriate action. A person can easily recognize the face of a friend in a large crowd of people.

We are visual creatures. A picture can represent many ideas. A picture of the walkway in a large shopping mall in Anycity, USA can convey large amounts of explicit and implicit information and prompt an incredible variety of subjective responses. Our ability to recall information by mental images is equally remarkable. If you ask someone when was the last time they flew a kite, in a second or two they will recall some element of that experience. This is an astonishing feat given the vast number of sensory experiences, both physical and intellectual, that the mental processes selectively disregard in allowing one to remember the experience of flying a kite. Even more astonishing is the speed by which the human mind processes and delivers the information to the consciousness. Thus, the ability to convey information visually is both an excellent way to summarize information and an efficient way to remember that information.

The news media have gradually increased the amount of graphics that they use. An excellent example is provided by the newspaper *USA Today*, with its vivid use of color and graphics.

In education, one way to capitalize on this capacity is to teach students graphing skills. Consider how easy it is to look at and process a picture of data (a graph) as contrasted with processing a table that represents the same data. In scanning a typical social studies book, one can see a variety of visual representations of information. Many of these use some form of graphic model. Likewise, in many vocations it is assumed the practitioners knows how to use charts and graphs. It is a skill that is applied in almost any area of endeavor. Teaching students to make, understand, and use graphs is therefore an important aspect of education. It provides a powerful way to concretize and summarize information.

Typically there are four types of graphs that students need to know how to make, read, and use. Two of the four kinds of graphs are pictographs and bar graphs. These graphs are used to make comparisons between different quantitative relationships. They are closely related. One can think of a pictograph as a bar graph in which the bars are made up of copies of a small picture or icon. For example, comparing the type and number of vehicles in a school parking lot is one way to show how these graphs can convey concrete numerical relationships. The pictograph would use different icons to represent cars, pickups, bikes and so on. Perhaps an icon would stand for 25 vehicles. Then a stack of six car icons (a bar made up of six pictures of cars) would represent 150 cars. In contrast, the bar graph would use the length of the bars to pictorially represent the quantitative relationships between the various vehicles in a school parking lot.

Circle graphs (pie charts) like bar graphs are used to compare quantitative data but unlike the latter they are used to compare parts of a whole to that whole. For example, the proportional number of each color of M & M's in the total bag of M & M's could be represented using a circle graph. The percentage of various colored M & M's in the bag could be used to partition the circle graph into proportional slices. Or the total national energy consumption of coal, gas, nuclear, and other natural energy sources is often represented using a circle graph. And like the M & M example, the circle graph is proportionately partitioned off to show each type of energy consumption compared to the total.

The last type of graph is the line graph. The line graph is used to show trends. For example the temperature changes that occur between February and June of a given year can be represented by such a graph. Another appropriate use is to show the change that occurs over time in an opinion poll of two political candidates.

An equally important skill associated with making, using and reading graphs is the critical thinking skills necessary to examine the information displayed by a graph. For example, distortion of information can be easily done using graphs. If the dramatic shift in public opinion polls between the 1988 democratic convention and the few weeks before the presidential election were represented graphically, the public opinion shift could be made to appear less by manipulating the unit distance along the ordinate of the graph. Teaching students to be wary of such techniques and to critically look for biases or other forms of distortion is very important.

In this session we explore the types of graphs and the uses to which they can be best be put. As in the earlier sessions we will first let them experience a piece of software and then contextualize their experiences by facilitating a debrief. Although we will be using two different pieces of software, the problems solving and critical thinking skills associated with making, using, and reading graphs can be examined independent of a given piece of software.

A key feature of computers is that they can easily change the way data is represented. Thus, a typical graphing program can quickly change the representation of a set of data from a bar graph to a pie chart to a line graph. This is a useful instructional aid. Students can explore various representations of data and make decisions about which is most appropriate to a given situation. Note that this is making use of a "hyper-like" feature of writing in computer readable form. A hypertext need not have static displays. Rather, the reader of the text can ask for data to be displayed in a form that best fits his or her needs.

4.7.2 Script

Theme

Graphing.

Objectives

1. Instructional objectives are:
   a. Let the participants experience using a graphing program.
   b. Make explicit (by using a consultative format) how their experiences can be transferred to the classroom with an emphasis on the problem solving and critical things skills associated with making, reading and using graphs.
   c. Provide a meaningful experience for the participants.

Materials

Software	*Handouts*	
Easy Graph II	PA # 1	(a class set)
or		
MECC Graph	PA # 2	(a class set)
	Weekly Logs Game of the Week	

Refreshments

As usual.

Assumption

Participants are familiar with the use of graphs to represent data. They are aware that different sorts of graphs, such as pie charts and bar graphs, are used for different purposes. They have some understanding of the amount of work required to draw a graph, and that often this is beyond the capability of many students in social studies classes.

Pre-Session

1. Boot the computer systems with the software.
2. Have the Performance aid for the first activity on or near the computer.
3. Have a large screen monitor, overhead projector or blackboard available for demonstrations and debriefing purposes.

Introduction

This script will focus on using Easy Graph II. Both Easy Graph II and MECC Graph can be used for this session and were in fact used during the early stages of the project. (A performance aid for the MECC Graph program is included in the handouts). Note that there are a large number of other commercially available graphics packages that are quite suitable for use in this type of inservice and in social studies classrooms. Because the important concepts surrounding the use of graphs in the social studies is largely independent of a given piece of well structured graphing software, the activities and debriefing with focus only on one piece of software.

Activity:
35 minutes

Purpose: This activity is to acquaint the participants with several different types of data presentation graphs (pie, line, bar, pictograph) and some of their uses for representing data. An analysis is made of the important skills needed to make, read, and use graphs, and the potential use and misuse of information is examined.

Transition

Ask the participants to turn off their monitors and to focus their attention to the debriefing.

Debriefing:
20 minutes

The activities in this session require that participants become acquainted with several different types of graphs that computer graphics software can produce, and some potential uses of such graphs. The first part of the debriefing should make explicit the four different types of graphs discussed in the Narrative Overview and the special function for each type.

What are the four types of graphs you encountered in this activity?
With what types of data would best be represented using a circle graph? Pictograph? Bar graph? Line graph?

When the participants seem to have a good idea about the four types of graphs and are aware of some examples of their uses, the focus should shift to the general purpose behind graphical representation. Graphs model some relationship between data sets. All graphs share this essential feature.

What are the characteristics common to all graphs?
The response to this question will vary but with a little discussion you should be able to tease out the underlying principle that all graphs model relationships and can indicate the strength of a relationship.

In general, any social studies book makes heavy use of pictorial information, much of which is graphically displayed. The participants should make the conscious transfer from the computer activities they have just done to possible activities involving their students and the social studies curriculum. Because graphs model the relationship between data sets or variables, they are a good way to summarize information. A visual representation of the information is another way to represent an abstract idea or relationship and takes advantage of our natural ability to use and manipulate visual images. Equally important, the computer can quickly and accurately graph the data, thus freeing time to learn how to read, understand, analyze, and apply the information shown in a graph.

Do you think your students know how to use graphs?
Do you think it is important that they become acquainted with the different
    types of graphs? Why?
What are some effective ways of teaching students to use graphs in the
    social studies curriculum?
Do you have your students graph data?

These last couple of questions will set the stage for examining problem solving and critical thinking skills associated with graphs. Indeed, some of your participants may raise these issues as you discuss the use of graphs in the social studies curriculum. But for the moment, the debrief should center around how the computer can be used to construct a graph, thus freeing up time to be used in learning how to interpret and apply graphs.
Just before the break, tell the participants that when they return we will discuss the problem solving and critical thinking skills surrounding the use of graphs.

Break
10 minutes

Refreshments: Note: Remind everyone that we will start again in ten minutes.

Purpose

This next activity will examine the problem solving skills needed to work with graphs and examine the critical thinking skills associated with the interpretation of graphs. Note that relatively little of the total time of this session is spent in a hands-on mode. It doesn't take much time for a teacher to learn the rudiments of using a simple computer graphics package. The key issues are when to use such software, for what purposes, how does it affect the content and process of education, etc. Of course, this also raises issues about how long it takes students to learn to use the software, how readily the software and computers are available to students, and so on. If a student does not get a chance to practice drawing graphs by hand in social studies classes, does this damage the student's overall education?

Debriefing:
45 minutes

Graphs are quite useful in showing the strength of the relationship between two or more variables, and are quite useful in problem solving. This suggests two ideas to follow in guiding the debriefing. First, what problem is being addressed by a particular graph? Second, how does graphing fit in with the overall topic of problem solving and what we know about formal problems?

A graph frequently contains all of the characteristics of a formal problem. It has its givens (the data), its guidelines (type of comparisons to be made and the mechanics behind the generation of the graph) and its goal (a pictorial model). The motivational or personal element is the desire to generate the graph. Graphics provides a good way for students to see that a formal problem structure is an important structure not only in the sciences but also in social studies.

Can we view the generation of a graph as a formal problem or as a problem situation?
How can we help students come to understand that graphs are a useful aid in representing and solving problems?
Is this a good way to teach social studies students about formal problem structures?
Are formal problem structures as applicable to social studies as they are in the sciences?
Is it important that students know how to apply formal reasoning skills in the social studies?

Graphs can be used to check hypotheses, draw conclusions, and make deductions. It is important to help students learn to formulate hypotheses and then check the possible correctness of their hypotheses. Graphs are useful in the analysis, synthesis, and evaluate of information. Bring these ideas out in your debriefing. A classic example of a graph useful in such a discussion is the energy consumption of the major industrial nations since the middle of the last century.

What are the higher order thinking skills that can be brought to bear on the interpretation of the information in a graph?
How can graphs be useful to verify information or to check a hypothesis?
Can graphs be used to draw conclusions and make deductions?

The final major idea behind the use of graphs in social education is the critical analysis of the information represented. Graphs are amenable to distortion and misuse. The ideas presented in the narrative overview can be used during this component of the discussion. Introduce the example of polls in elections and how different political parties would represent the same data differently. For example, by adjusting the unit distance on the ordinate of a graph the polls can be made to appear to show a little or a great difference between the candidates. Another frequently used method of distorting data is to not show the zero points on a graph. This allows the graph to make a very small change appear to be a very large change. It is important to teach students not to take for granted the visual information in a graph. Learn to look for bias or distortion.

Why would someone want to distort information in a graph?
Why is important that students understand that representation of graphic information should not be taken for granted?
How can we teach our student's to examine critically graphic information (or any claim)?
How can we help students learn to detect errors that are made in representing data graphically?

Last Activity
10 minutes

The last few minutes of this session can be used to collect and discuss their projects, take care of logs, and so on. Ask some of the participants to briefly share parts of their projects with the group. [During the next session, after you have had time to review their papers, you can be more specific about their contributions and ideas on the use of computers in education.]

This Weeks Assignment

Game of the Week.

Logs

Logs are to be filled out each week.
1. The logs should be turned in.
2. New weekly logs should be handed out.

Closure

Review next week's activities.

4.7.3 Timeline

This is a sample timeline for the seventh inservice session based on the materials in 4.7.3. It makes use of a presentation graphics package. Note that relatively little of the time is spent in a hands-on mode. During the debriefing, point out that even grade school students can easily learn to use presentation graphics. But students need considerable instruction and practice in when to use graphics and how to effectively use them in solving problems and making arguments. This is a clear illustration of lower-order skills versus higher-order skills. We can spend a lot of time teaching students to be proficient at drawing graphs by hand. But most students won't get very good at this. Thus, most social studies teachers will not want to use valuable class time in having students draw graphs to represent data. The use of computer graphics software can thus allow a considerable change in one part of the social studies curriculum.

Computer graphics are also very useful in exploring "What if?" questions. Modern spreadsheet programs include a graphics presentation facility. Changes in the data in a spreadsheet are quickly calculated, and then the results are displayed graphically.

0:00 - 0:35	**Initial activity:** This activity is used to let the participants experience different aspects of graphic representation of data.
0:35 - 0:55	**Discussion**: The first part of the debriefing should make explicit four frequently used types of presentation graphs and the special function for each type.
0:55 - 1:05	**Break:** Everyone should return promptly.
1:05 - 1:50	**Continue the debrief:** This activity will examine the problem solving skills needed to work with graphs and to examine the critical thinking skills associated with the interpretation of graphs.
1:50 - 2:00	**Closure:** The remaining few minutes of this session can be used to collect and discuss projects and to take care of logs.

4.7.4 Handouts

The pages of this section are handout materials needed by the participants during Session 6 of the Social Studies Inservice. These materials are used by the participants as performance aids, course reference material, and as weekly assignment material. The facilitator may find it useful to make some of these into overhead projector foils for use during the inservice.

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CI^3 Social Studies Inservice: Easy Graph II

Before you begin using *Easy Graph II*, read about this program in the resource book (pages 5 - 6).

1. Boot up the computer with Side 1: Tutorial of **Easy Graph II.** (Press **RETURN** when the credits appear on the screen).

2. Select option #3, "Practice Using Easy Graph". Follow the directions as they appear on the screen. The data for the practice graphs can be found on pages 16-18 of the resource book. When you have completed "Practice Using Easy Graph", you will be given 3 more options. Select option #3 "return to main menu."

3. Select option #4, "Create your own graphs". After following the computer's directions for turning the disk over, select option #1 "Create your own graphs." You do not have a data disk, but type in 2 (data disk in drive 2).

4. Read pages 9-10, "How Do I Make A Graph Using Easy Graph II?", in the resource book. Then choose any one of the 4 graphing options. (Use the information on pages 16-18 to create your graph). Note: You will not be able to print your graph, nor will you be able to save your graph, so choose **N** to those questions.

5. Experiment with the various graphing options.

6. Read pages 25-26 ("Homework Helper I") of the resource manual. Create a bar graph comparing the *areas (sq. mi.)* of the above *countries*.

7. Read pages 26-27 ("Homework Helper II") of the resource manual and create the suggested pictograph comparing the *Pop—in thous* of several *countries*.

8. As time permits, browse and enjoy yourself!

CI^3 Social Studies Inservice: MECC Graph

MECC Graph is a relatively simple computer program designed for use by students in the upper elementary grades and higher. Using this material you may graph two types of data and represent the data in four different types of graphs. In this exercise you will be graphing information that can be used to illustrate various national trends.

1. The computer screen is displaying the MECC Graph title page. Press the SPACE BAR to read the next screen.
2. When you arrive at the Main Menu choose option #3 and press RETURN. Read the information on the screen and press the SPACE BAR to go to the next screen.
3. This section introduces some of the features of MECC Graph. (Remember if the ESC key is pressed twice you will return to the Main Menu.)
4. Press # 2 and press RETURN.

Graphing Number Pairs

1. Press #1 for the Line Graph and then hit RETURN.
2. You do not want to get data from the disk, so enter N for no and press RETURN.
3. Type Y for yes when asked if you want help and press RETURN.
4. The name of the graph will be *Trends in Education*, so enter the name and press RETURN. The name of the horizontal axis is *Time*. The name of the vertical axis is *% Pop. > 24.*
5. You will be entering the data listed on the next page. It will make three lines on your graph and you will need to name each line, so use the names—*% 8th Gr; % Coll.; % HS.*
6. When finished with your entry type N for no. (If you have made some mistakes you can return to the original data entry point by typing Y for yes.)
7. The first coordinate is the horizontal or X axis. On this axis you will enter Time values using only the last two digits. For example 1940 will be entered as 40 and *not* 1940. The second coordinate is the Vertical or Y axis. Enter the % POP. > 24 values for this axis.

% 8th Gr		*% Coll.*		*% HS*	
Time	*%*	*Time*	*%*	*Time*	*%*
1940	28	1940	5	1940	14
1950	20	1950	6	1950	21
1960	17	1960	8	1960	24
1970	15	1970	11	1970	33
1980	10	1980	18	1980	36

Various key entry options are listed at the bottom of the screen.

8. When finished entering your data type G for graph.
9. The graph that appears is automatically adjusted to a gross scale. Adjust your scale to get the best visual representation or "fit" for the data. **Do not use the print option.**

10. Now that you are more familiar with the MECC Graph, two other sets of data are listed below. Each set of data is labeled according to the type of graph that is best used with the data.

Pie Chart

Title: Percentage Distribution of Energy use in the U. S. A. (1981-82)

Energy Consumer	*% Use*
Industry	30
Housing/Commercial	25
Transportation	20
Electricity	25

Bar Graph

Title: Major Imports of the U. S. A.

Import Categories	*% of all Imports*
Petroleum	24.5%
Automobiles & Parts	9.5%
Textile, Clothes, Footwear	4.6%
Chemicals	3.4%
Iron and Steel	2.6%
Nonferrous Base Metals	2.0%
Meats and Fish	2.0%
Coffee	1.5%

Game of the Week (Week 7)

Take the attached survey, copy it, and give it to the students in one of your classes. They may need some help on some of the questions. After students have completed the survey, you may want to use the questions to initiate a class discussion. Summarize the results from the survey and comment on any of the results you found particularly interesting or surprising.

Computer Attitudes Survey

Instructions:
Please put an **X** in the box that best describes your reaction to the following statements.

	strongly agree		neutral		strongly disagree
1. Computers can improve learning of higher order skills.	☐	☐	☐	☐	☐
2. Computers will improve education.	☐	☐	☐	☐	☐
3. Computers can improve drill and practice.	☐	☐	☐	☐	☐
4. Computers will create jobs needing specialized training.	☐	☐	☐	☐	☐
5. Computers will improve health care.	☐	☐	☐	☐	☐
6. A person today cannot escape the influence of computers.	☐	☐	☐	☐	☐
7. Computers will displace teachers.	☐	☐	☐	☐	☐
8. Computers will dehumanize society.	☐	☐	☐	☐	☐
9. Computers can teach better than teachers.	☐	☐	☐	☐	☐
10. Computers are beyond the understanding of the typical person.	☐	☐	☐	☐	☐
11. Computers will replace low-skill jobs.	☐	☐	☐	☐	☐

From *Computer Attitudes Factor Structure* in Cognitive and Affective Computer Attitude Scales: A Validity Study, by S. H. Bannon, J. C. Marshall, and S. Fluegal, 1985, *Educational and Psychological Measurement*, 679-681.

Results of Game of the Week (Week 7)

The following is a summary of all the data collected in this survey. Immediately following is a summary of additional comments made by students and teachers who participated in the survey.

Computer Attitudes Survey

Numbers are percentages

	strongly agree		neutral		strongly disagree
1. Computers can improve learning of higher order skills.	19	28	31	16	6
2. Computers will improve education.	36	32	19	6	7
3. Computers can improve drill and practice.	36	32	14	12	6
4. Computers will create jobs needing specialized training.	49	19	22	4	6
5. Computers will improve health care.	10	15	29	21	25
6. A person today cannot escape the influence of computers.	41	16	15	17	11
7. Computers will displace teachers.	10	4	21	21	44
8. Computers will dehumanize society.	12	9	33	20	26
9. Computers can teach better than teachers.	10	5	17	16	52
10. Computers are beyond the understanding of the typical person.	13	15	29	22	21
11. Computers will replace low-skill jobs.	21	19	38	17	5

From *Computer Attitudes Factor Structure* in Cognitive and Affective Computer Attitude Scales: A Validity Study, by S. H. Bannon, J. C. Marshall, and S. Fluegal, 1985, *Educational and Psychological Measurement*, 679-681.

Some general comments made by some of the teachers and students that participated in the survey

The comments are from two Global Studies classes.

Students felt that computers can improve learning of higher order skills, can improve education, can improve drill and practice, and will create jobs needing specialized training.

Students did not feel that computers will improve health care, displace teachers, or teach better than teachers. Students were neutral on whether computers will dehumanize society and whether computers are beyond the understanding of the typical person.

Finally, students felt that a person cannot escape the influence of computers, and they leaned toward the idea that computers will replace low-skill jobs.

The "health care question" was the only surprise; they do not know what a computer already does in terms of health care.

Some comments:

Senior class in Political Science—state and local government.

Nineteen students—a very "normal" class as far as grading curves go.

Remarks:

Question #1 - Several students needed an explanation of "higher order skills." Because of this, I think the results were consistent with what I would expect.

Question #2 - Not an unusual result.

Question #3 - Same as #2—several have used computers for this purpose.

Question #4 - No problems here!

Question #5 - Strange distribution. I expected more strong agreement; perhaps due to their age and not being parents yet. Older people would tend to agree more strongly.

Question #6 - We all agree!

Question #7 - Certainly not! Well, maybe not! Most students are pretty sophisticated, it would seem.

Question #8 - They didn't know what it meant. I wasn't certain myself—robots, artificial intelligence? I think we all missed the point.

Question #9 - Again, we agree! No computer could do what I do—it would blow a fuse!

Question #10 - I don't find this response unusual. Some students have never been exposed to computers, but more than half of them have been. We need to *educate* for understanding.

Question #11 - Curious. I would like to know the 5 "strongly agree" persons, because some of these kids have parents (male) who are unemployed, and I wonder if there is a connection.

Conclusions: I would like to see an expanded questionnaire, including educational and family background. We need to *educate* for the computer—even more usage and exposure to it would help.

The partial results of a survey that was given to a sixth grade reading class of 23 students.

1. Students generally agree that computers improve the learning of higher order skills.
2. Students generally believe computers will improve education; however, 8 were neutral.
3. Students seemed unsure as to computers improving drill and practice.
4. Computers creating jobs needing specialized training brought mixed feelings.
5. Mixed results concerning health care improvement were obtained with slightly more disagreeing.
6. The majority of students felt people could escape influence of computers.
7. Students felt computers would not replace teachers.
8. Computes will not dehumanize society according to the results.
9. Teachers are still important.
10. A large number of students were indecisive concerning the typical person understanding computers.
11. Again, the students seemed unsure on the issue of whether computers will replace low-skill jobs.

The responses to numbers 5, 6, 10, and 11 surprised me. With the new technology in the medical profession, I felt students would indicate improved health care. Maybe their responses are related to their concept of number 6. Students basically felt that they could escape the influence of computers. This indicated a basic lack of knowledge of what is happening. Maybe this is a result of not yet having a computer class. Students evidenced uncertainty on numbers 10 and 11. Again, this points to a need for added experience and exposure to computers.

4.7.5 Materials

There were no additional Materials for this week. The typical computer graphics package contains a variety of exercises for use with students. The typical social studies book contains a large number of tables of data and of graphs of data. These are easily adapted for use with a computer graphics package.

4.7.6 Readings

The "Readings" sections of this Notebook are designed to supplement the materials presented during the inservice sessions. It is appropriate to assign these readings as "homework." Because the last session will include a demonstration on telecommunications, a paper on telecommunications is included in this section.

Bibliography:

Savage, T.V., & Armstrong, D.G. (1983, November/December). Visual frameworks: Teaching learners to process information productively. *The Social Studies, 74*, 257-260.

Note to readers: Next week's session will include a demonstration of using on-line databases. The article given below provides some interesting background information.

Modem
Dave Moursund

(From EDITOR'S MESSAGE in *The Computing Teacher*, May, 1985.)

Recently I purchased a modem for one of my home computers. I am not sure why I resisted so long, but I suspect that there is a deep psychological reason. I also discovered several other reasons as soon as the modem was installed. The modem precipitated a family crisis. A shouting match between two of my children (one wanted to talk via voice to friends; one wanted to talk via computer to bulletin boards) led to both losing phone privileges. Also, my wife threatened bodily harm to the computer when she saw us tying up the phone for an hour or two a day.

The obvious solution was a second phone line, and that has now been installed. I feel fortunate to be able to afford such a luxury: $15 a month to purchase family harmony. Still, that isn't the end of the story. I am finding that spending an extra hour a day on a computer has changed my social interaction with my family. Moreover, it adds to the contention for access to one of our three home computers. It seems clear that I have not yet worked my way through these issues. But these personal issues seem small as I think about larger issues of communication via and/or with a computer.

Twenty years ago I was teaching at Michigan State University in East Lansing. A computer terminal, telephone, and modem were installed in a room in the computing center, and I was told that the system could be used to call a timeshared computer system in Chicago. That was my first exposure to BASIC and to use of a modem.

I recall the psychological barrier. The terminal, timeshared computing and telecommunications were all new to me. The documentation was poor. I knew that long distance phone calls were expensive. Computing via commercial long distance phone lines was still relatively new.

However, after much trial and error I learned to use the system, gaining an initial appreciation for timeshared BASIC, use of a modem, and difficulties associated with using a remotely located computer via the commercial telephone system. During the past 20 years I have learned quite a bit about using remotely located computers.

In this message I want to comment on three general types of usage of a computer system via a modem. First, such a system can be used to access a computer in order to write computer programs. Twenty years ago that was really something—being able to do interactive computing on a timeshared system. Our university's large large computer system could process FORTRAN, COBOL and assembly language in a batch mode with punched card input. Now, of course, we are all familiar with interactive computing. If the quality of the system is high, it tends to make little difference whether the CPU is located just a few inches from the keyboard or is located many miles away. What difference does it make how long the interconnecting wires are? The key idea is interactive computing, and that can be done using a variety of equipment.

A second major use of a computer with modem is to access databases. Many of the databases one would like to access are quite large and require considerable expense to keep updated. Thus, the most common way to access these databases is via a modem-equipped computer system.

But such access is now commonplace and in many business settings is a necessary cost of doing business. Imagine running an airline ticket agency without access to the computerized reservation system.

Nowadays the issue is not the hardware. Rather, the issue is the software and the training needed to adequately use the software. Consider problems associated with accessing the type of information found in a (print material) library. All of us have been trained to use a card catalog, to physically locate materials in a library, and to browse. Access via computer changes the situation.

I don't think the main difference is learning to use the computerized equivalent of a card catalog. The amount of training needed to use a card catalog could just as well teach a person to search a computerized data bank. The task of physical location of materials is changed, but the change may make it easier. What could be easier than having the material immediately displayed on one's computer screen? (Of course, retrieving books and journals via inter-library loan can be a pain, but that difficulty exists independently of computerized data banks.)

The main change is browsing. How often have you gone to a library to find a particular book, and then ended up checking out several books located on nearby shelves? One can browse a data bank, but two things are different. First, the concept of "nearby shelves" is missing. Thus, it takes specific training to learn to use a computer system to browse related materials. But perhaps much more difficult is the psychological barrier of cost. When I am in a library, the cost of browsing is the cost of my time; moreover, browsing is fun. When I am on a computer system there are computer charges, communications costs, and charges to access particular data banks. All in all I find these to be quite intimidating.

A third area of modem use-and the main motivation for this message-is for electronic bulletin boards and electronic mail. A computerized bulletin board is somewhat like a "hard copy" bulletin board on which one can post messages and comments. The messages and comments may be arranged by topic and/or who is allowed to access them. Electronic mail is roughly like regular mail, but the actual transmission of a letter is done electronically.

One can argue that bulletin boards and electronic mail are merely slight variations on traditional written communication. Certainly it makes little difference whether a carefully composed business letter is transmitted electronically or by the postal service. And jotting a quick memo to an acquaintance is similar to keying in a short message to an electronic mail system.

But those examples are not representative of what happens in an electronic bulletin board environment. A number of people may get involved in concurrent discussions of several topics. Many of the people may never have met face to face. The pace of the communication may be rapid, with messages being entered and read once a day or even more often.

For me, electronic bulletin boards represent a unique new mode of communication. The closest thing in my personal experience to the bulletin board was when I was a ham radio operator. As a bunch of people who didn't know each other would chat about miscellaneous topics. Frequently the topic was their radio equipment; the fun was in establishing and maintaining the communication link.

Bulletin board communications tend to focus on issues rather than on the computer systems being used. They can involve a number of people who have no knowledge of each other's backgrounds and viewpoints. Under such conditions effective communication is challenging, if not downright difficult.

One example will help illustrate what I mean. In one bulletin board that I use regularly, the topic of testing in schools arose. Various people expressed opinions on this topic. One person absolutely blasted the idea of testing of any sort, supporting his position with strong, emotion-laden arguments. I responded to this person with some "logical" arguments to suggest that he was wrong. He responded with more arguments along the line of his original approach.

It seemed clear that even though we were exchanging written messages, we were not communicating. Eventually it became clear why. I come from a traditional educational background, and I was quite successful in our traditional educational system. But the person I was trying to communicate with has dyslexia. He did very poorly on tests while in grade school. As a consequence he was labeled as mentally retarded and did not receive an early education appropriate to his needs. It is no wonder that his arguments about testing are emotion-laden and that we were not able to communicate effectively.

But that is a key point. When humans communicate face to face, a significant percentage of the communication is nonverbal. (I have heard estimates that range up to two-thirds or more.) Much of the communication is in the affective domain. Electronic bulletin board communication is quite restricted in the affective domain. This is especially true when one is composing "live" at the keyboard, realizing that costs are mounting.

Communication is difficult enough when one is allowed to use all of one's senses and abilities. The restrictions imposed by an electronic bulletin board severely impede communication. As with any new technology, electronic bulletin boards have both good and bad features—both good and bad potential. Likely we will once again look to our educational system for help. I can imagine that "Bulletin Board Communication" will eventually enter the scope and sequence of our school curriculum.

4.8

Session 8: Problem Solving, Telecommunications, and Closure

4.8.1 Narrative Overview

This is the last of the sessions in this inservice series. The designers of this series of inservices were confronted with a difficult problem. There were a number of topics that could have been included, but time did not allow all to be covered. Telecommunications for on-line searching of databases , for communication with other people, and for bulletin board communications, provide an excellent example. The use of CD-ROMs and/or other large capacity computer storage media provides another example. We decided to use about a third of the time in the final session to expose participants to on-line databases. This was intended purely as an exposure. If more time were available, we surely would have devoted an entire session to on-line searching of databases and the use of CD-ROM systems.

Overall, we had two goals in mind during the final session. First, the session summarizes and unifies the ideas that have been covered so far. Second, it focuses on problem solving, which is at the very heart of use of computer as a tool. (In some versions of this inservice series the participants will be presenting their "term" projects. This is a good design to use, particularly if the inservice series is longer than the 16 contact hours described in this Notebook.) In helping to lead the debriefing on these projects, you should emphasize problem solving and critical thinking.

A school provides an environment where the students can learn skills that will be useful in their daily lives. To get an education is to acquire skills that transfer to real life situations. As noted in an earlier chapter, it is difficult to facilitate transfer. Research has shown, however, that the type of learning environment helps determine the type of transfer that can or will occur. **Those environments that encourage discovery seem to facilitate far transfer, and situations that involve direct instruction tend to facilitate near transfer.** Both forms of transfer are useful. Far transfer of skills seems to be the preferred goal in most educational settings. But the near transfer of information, such as having quick recall and knowing how to use some of the facts specific to a discipline, is also important. Indeed, research on problem solving says that both domain specific knowledge and ability to apply this knowledge in a wide variety of situations (far transfer) are essential in problem solving.

A strong knowledge base (domain specific knowledge) is important to being a good problem solver within a specific domain. Thus the acquisition of facts is an important foundation stone to acquiring greater problem solving expertise. But memorization of isolated or related facts by itself is of little value. It is the ability to selectively apply these facts to situations that allows us to better understand and come to terms with our world, and to solve problems.

A fact is something that exists or has occurred, and is verifiable. It is data that typically has an objective foundation but is open to interpretation as well as to degree of emphasis in its use and manipulation. Concepts are made up of facts. The facts associated with a concept are grouped according to some rule that gives definition to the concept. The interpretive nature of concepts, particularly contested concepts, is a common subject of social education. Groups of concepts may form a model. A model is much more global and political in its interpretation and application.

The roles that facts play in problem solving strikes at the essence of information use and highlights the need for critical thinking skills. Because of the information explosion and the ease with which computers can manipulate that information, the same facts can be used and interpreted in many different ways. For example, often in presidential elections the facts can be interpreted in a very different fashion by different political parties. The information brokers, that is, those who have control over the management of information, wield a great deal of power. The proper use or abuse of this power should be of concern to all of us. This is further amplified by the changing political, economic and social environment in which we all live. The need for critical analysis of facts and associated concepts and models is even more important.

Understanding the use of computers and attendant programs is thus quite important and is part of what is often called computer literacy. People not only gather the facts but program the computer. Thus all the facts placed in any program have human authorship and any computer system is only a reflection of that human authorship.

The inservice participants need to think about facts and concepts but also about the use of computer as a political and social tool. Very large databases are being kept in New York, Washington D. C., and other parts of the country. The data in these databases can be used for good purposes; however, it can also be used for purposes other than what was originally intended. This information is easily accessible to those information brokers who control its flow. Human authorship is associated with most all educational and social events. Thus students need to become aware of their responsibilities and begin examining issues associated with the use of computers in their lives.

The discussions during this session involving problem solving, critical thinking and the use of facts and computer use and abuse will bring out a lot of diverse views. These ideas, like those in any interpretive framework, will not be resolved; but they are important issues to raise and examine. Ultimately we will all have to deal in an operational way with these issues.

Portions of this last session can be used to summarize and review many of the ideas on problem solving and critical thinking. But the primary emphasis is on social implications of computer use in education and society. Perhaps the hardest question to answer is, if a computer can solve or help solve a certain type of problem, what do we want students to learn about solving that type of problem? The range of problems that computers can solve or help solve will continue to grow quite rapidly as computers become faster and cheaper, and as computer scientists make progress in developing more sophisticated programs. It is not too clear what constitutes an appropriate education for life in our rapidly changing, information age society. But it is clear that students should gain better skills at critical thinking and problem solving. It is clear that students should come to understand the use of the computer as a tool to aid in critical thinking and problem solving. It is important that social studies teachers help their students to gain these skills and understanding.

4.8.2 Script

Theme

Problem solving, critical thinking, and critical issues of computer use in education and in our society. What constitutes an appropriate education for life in our rapidly changing, information age society?

Objectives

1. To review the concepts of a formal problem and the nature of formal problems in the social studies.
2. To examine problem solving and critical thinking in social studies education and how it might be impacted by the increasing availability and capability of computers.
3. To examine some uses of telecommunications systems in education and in our society.

Materials

Software	*Handouts*
U.S. History	PA 1

Refreshments

Since this is the last session, it is a good excuse to celebrate. Refreshments should be especially good!

Assumption

Participants are quite aware that our world is changing quite rapidly and that technology lies at the heart of much of this change. The rate of change appears to be accelerating, rather than slowing down.

Pre-Session

1. Make sure the PA1 for *U.S. History* is beside each computer.
2. Set up a large monitor or projection system to be used in demonstrating telecommunications.
3. Test out the telecommunication link to the system that will be used during the inservice session. (We used CompuServe.)

Get Started
20 minutes

As participants enter the room, get them started in using the *U.S. History* program. The program uses a game format similar to the television version of Magic Squares. The software is designed so that a teacher can use either the already programmed games or design his/her own materials. In this session the already programmed game option is used. While the content of the game is important in playing the game, this content is not the focus of the session. There are three main focuses, and they should be brought out during the debrief:

1. Use of this or a similar game as both a motivational aid and as an instructional tool to teach or reinforce various historical facts.
2. Lower-order skills versus higher-order skills.
3. The value of such a program in teaching problem solving or reinforcing ideas of problem solving that have been previously taught.

Debrief
20 - 25 minutes

A knowledge base is important to being a good problem solver. This exercise is one way to demonstrate how social studies students can learn historical facts. While is is obviously not the only way to teach facts, it does have a strong motivational element. Most teachers like to make use of a variety of tools and methods to help students in learning about historical, social, or economic events. This software package is a good addition to the teacher's instructional repertoire.

During the debriefing, the role of facts and critical thinking will be addressed. A fact is something that exist's or has occurred and is verifiable. It is data that typically has an objective foundation but is open to interpretation and degree of emphasis in its use and manipulation. A concept consists of elements or groups of facts that are grouped according to some rule. What constitutes a concept is obviously subjective, so a concept for one person might not be a concept for another person. The interpretive nature of concepts, particularly contested concepts, is even more subjective. Religion and politics provide good examples.

A discussion of what role facts play in problem solving should include what determines a important fact versus an insignificant fact. This strikes at the essence of information use and highlights the need for critical thinking skills. There are far more facts available than any one person could ever hope to learn. What facts should one learn? Who should decide?

You may need to emphasize that critical thinking is the ability to consider the authenticity or worth of information. The role of computers and attendant programs should also be addressed. People not only gather the facts but also program the computer. Thus, all the facts placed in any computer program have human authorship and any computer system is only a reflection of that human authorship.

The participants need to think about facts and concepts but also about the use of computer as a political and social tool. Incredibly large databases of data about people (YOU!) are being kept in New York, Washington D. C., and other parts of the country. Big brother is watching you and has a lot of data available about you.

This discussion involving problem solving, critical thinking, and computer use and abuse will bring out a lot of diverse views. The central ideas should be placed on the chalk board and made explicit. The following is a list of some questions that you might want to use in guiding the debriefing.

-Was this a "fun" piece of software?
-Do you think the kids would enjoy using it?
-Motivation. How critical is it to problem solving?

-What is a fact?
-What is a concept?
-What is a model?
-Can any problem be solved without the use of facts?
-What role does critical thinking play in the selection and use of facts.
-How do computers get and manipulate the facts?
-How do we get students to critically assess information?
-How can we use the computer to assist in this process
  of critical assessment of information?
-How do we teach students to look at computer information and computer
  use critically?

Break:
10 minutes

Just before the break, review what will be happening during the last half of the session. This will include the demonstration of an on telecommunications system, some discussion of the projects turned in the previous session, evaluation of the inservice, and closing activities.

Demonstration
30 - 40 minutes

Purpose: The purpose of the next section of the inservice is to demonstrate a telecommunication system.

After the participants return from the break the facilitator begins a demonstrations of an on-line telecommunications system. The facilitator can use any number of resources available. Because the protocols vary between different on-line systems, little attention is given to highlighting how to log on and so on. With an on-line service like CompuServe there is ample documentation available for its use. The nature of this part of the session is more to demonstrate and give a flavor than to give instructions on the mechanics of using a telecommunications system.

Telecommunications system are commonly used in our society to access, assess, transfer, and generally manipulate information from a remote site. Although schools may not want to pay for the on-line expense involved with a daily use of such systems, it is important that teachers and students become acquainted with some of the educational uses of telecommunication systems.

It is clear that eventually the on-line searching of databases will become common in schools and in homes. (The French government, which owns the French telephone system, is installing a telecommunication terminal into each house that contains a telephone.)

One of the important issues involving telecommunications include being able to access and use information from a common pool. This use may represent information from the stock market to be used in a business or economics class, or the UPI wire service with unedited copy to be used in a discussion on the free press and the dissemination of information. This latter use is a complement to the earlier discussion on critical thinking and concerns about computer use and abuse in an open society.

Debriefing

Due to severe time constraints during this session, it will likely be necessary to do the debriefing during the telecommunications demonstration. Questions centering around possible uses for such a system in education will likely be the most productive.

-What are some of the educational uses of on-line systems?
-Why is it important that students know about such systems?

Projects
10 minutes

Return the term projects with your written comments. Some of these comments will be specific to the individual while other comments may center around a particularly succinct idea expressed by someone in a paper. In the latter case, some sharing among the group is appropriate. The inservice participants are a wonderful reservoir of information and talent. This talent will come out in some papers. Some example of actual papers written by inservice participants are included in the materials section of this chapter.

Closure
10 minutes

It is difficult to bring an inservice series to an end, since a number of personal contacts and friendships will have developed. Perhaps the key idea to stress is that the inservice has served as a beginning, and that the content and friendships will last a lifetime. It is desirable to talk about follow up and support groups or support services. These may well include support services provided by you or other people in your local area. The relationships that have developed over the eight sessions provides an opportunity for people to continue to communicate after they have return to their school. Generally, every group has a number of people that are good resource people. These individuals should be be actively curried to become a resource for you and the inservice participants.

Evaluation
15 - 20 minutes

It is assumed that you will use some evaluative tool to gauge the effectivness of the inservice sessions. A sample is given in section 5 of this Notebook. Reserve an appropriate amount of time to complete this process.

4.8.3 Timeline

This is a sample timeline for the final inservice session. There are a number of important topics to be covered, so the timeline is tight.

0:00 - 0:20	**Initial activity:** This activity is useful for demonstrating how a computer can be used to teacher or reinforce important historical or social facts. It will be using the *U.S. History* piece of software.
0:20 - 0:45	**Discussion**: The debriefing will center around the use and interpretation of facts. Problems solving and critical thinking are important considerations in this discussion.
0:45 - 0:55	**Break:** The inservice provider can use this time to set up (do the final test of) the telecommunications demonstration.
0:55 - 1:30	**Activity:** The telecommunications activity will demonstrate the on-line resources available on CompuServe. Debriefing and/or discussions should occur during the demonstration.
1:30 - 1:40	**Projects:** Return and discuss the participants' term projects.
1:40 - 2:00	**Closure and Evaluation:** This last time block will be used for closing comments and any evaluation activities.

4.8.4 Handouts

The pages of this section are handout materials needed by the participants during Session 8 of the Social Studies Inservice. These materials are used by the participants as performance aids, course reference material, and as weekly assignment material. The facilitator may find it useful to make some of these into overhead projector foils for use during the inservice.

This section also includes a few examples of the term project that was required of participants. The purpose of the project is to get the participants to think about how to prepare today's students for the information age. Special emphasis should be placed on the personal nature of the paper. The issue is what each individual teacher can and will do, individually in their own teaching, to improve our educational system.

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CI^3 Social studies— Inservice: U.S. History

The purpose of this activity is to introduce you to an instructional program. *U.S. History* game with a magic squares format.

1. The program has been started for you. Please enter your name and press return. Then enter your partner's name and press return.
2. The game will continue with some text and begin loading data (information to run the game).
3. In the in the *U.S. History* binder is a booklet. Pages 2 through 6 of this booklet give the guidelines for playing the game. Read the guidelines and then begin playing. Enjoy!

The papers given below were written by participants in a National Science Foundation inservice series that was held on the University of Oregon campus in Eugene, Oregon. The papers are reproduced with the permission of the authors who are all secondary school Social Studies teachers living within easy commuting distance of Eugene.

POSITION PAPER

NSF SOCIAL STUDIES PROJECT

A. C. MacDonald
Cottage Grove High School

What changes need to be made in Social Studies Education in order to prepare today's students for the information age? To answer that question we must first determine if an appropriate social studies education core is more important than a curriculum based on urgent domestic issues and the realities of global interdependence.

As a long-time educator, I have seen things come practically full-circle. When I started teaching in 1959, our social studies curriculum included 10th grade World History, 11th grade U.S. History, and 12th grade American Problems. After 28 years of experimentation, argumentation, and aggravation, we now have 10th grade Global Studies, 11th grade U. S. History, and 12th grade Government and Economics. What a change!

During the late 60's and early 70's we were smitten by Ted Fenton's "New Social Studies." The emphasis was on the inductive method and the use of original sources. After watching Ted teach a class of high school students, I decided his use of the inquiry method didn't allow for real inquiry outside of the limited material he was dealing with that particular period.

We were swept up in the idea of mini-courses in the 70's—sometimes called the "Balkanization" of Social Studies. It made a great deal of sense to let each instructor design courses that would allow him to teach in areas of special interest and expertise, but did it serve the pupils well?

At one time, we had 18 electives in our department, ranging from American Military History through Sociology, Anthropology, Minority Groups, and such timely courses as "Issues Today." While instructors enjoyed this, we finally realized that students could slip through the Social Studies Curriculum and never write one paper, never do any kind of social science research, and never take an essay test, let alone learn that Rome isn't a kind of apple you dunk for.

People at the state level perceived this, too. They attempted to rectify the problem by mandating that schools teach a required one-year course in Global Studies.

After numerous conferences, most of which centered on determining "What is Global Studies?" the state threw the ball back to the school districts and said, "Well, we don't know what it is, we don't have a sample curriculum, we have no approved textbooks, but you guys go ahead and teach the course." Whoopee!

In a curriculum survey issued in August 1987 by the State Department of Education, we find every school teaching something resembling Global Studies, including World History, Humanities, Global History, Developed Nations, Underdeveloped Nations, Current Affairs, Global Realities, World Cultures, World Geography, and Change Through Revolutions. This sampling is from *one* page of the report, covering just our local area. Common curriculum, indeed.

Other curriculum groups have been trying to figure out what is important. The Council for Basic Education recommended "as an irreducible minimum" two years of American History, one year of European History, and an "in-depth" study of at least one non-Western society. If we only had to teach social studies in the public schools, this would be great. Unfortunately, that's not the case.

With the publication of "A Nation at Risk," school boards across the nation immediately raised graduation requirements in practically every area. One result is inter-departmental squabbles about what's important—Animal Husbandry or World History, a second year of health or a third year of math, and so on—ad nauseam.

Another huge problem in the social studies curriculum, even within a single school, is the diversity of the individual staff members' priorities. As Fred Newman notes in *Social Education*, teachers can be roughly divided into four categories:

1. *The Content Specialist.*

   The traditional teacher communicating formal knowledge as represented in history and government.

2. *The Special Topic Enthusiast.*

   The person interested in expanding the student's knowledge of problems arising not necessarily from the formal discipline, but from other discourses on public affairs, social service, and the human condition. These people are perfect in the mini-course curriculum, but sometimes wind up circumventing the regular curriculum by going off on their own tangents. Very discouraging if students have to switch instructors at semester time.

3. *The Skills Teacher*

   Sees content primarily as a means of teaching literacy, inquiry, critical thinking, and civic participation. Ted Fenton's disciple.

4. *The Builder of Relationships*

   These individuals are sometimes referred to as the "touchy-feely" type. Their emphasis is on honest, open relationships. They want to help students develop positive self-images.

With this many diverse types of people teaching in the Social Studies, it is no wonder that many critics say it is just a disorganized mass of material searching for coherence.

Well, what can be done about this state of the field? According to the National Council of Social Studies, most educators can agree that the common curriculum should address:

- Knowledge of and pride in our local and national heritage.
- Interest in understanding the form and function of government and the economy.
- The need to engage in more active civic participation.
- A cosmopolitan appreciation of other cultures and value systems.
- A strong emphasis on active learning to replace the read, respond, lecture, and textbook approach.

It is in the latter area that I perceive the potential value of the computer in the classroom. At the present time, no one in the Social Studies Department at Cottage Grove High School has regular access to a computer for classroom use. This is an incredibly limiting factor, but there may be ways to work around it. The library has some computers and students have access to the computer lab several periods a day.

Databases certainly open up a number of possibilities for research and critical thinking, particularly in Global Studies. I would like to see each Global Studies teacher have a terminal, where individuals or small groups could work on projects.

This is probably going to take a great deal of rethinking on the part of most teachers. Most of us are programmed to keep all the students working on the same task at the same place. The person who can have 25 students working on 15 different tasks during a 48-minute period is extremely rare, not because teachers don't want to individualize their programs, but because teaching six periods a day, a person simply runs out of resources to keep the whole thing going. As Tommy Prothro used to say, "It's hard to remember you came to drain the swamp when you're up to your ass in alligators." If a person had a year's sabbatical to sit down and draft a course that was individualized and included access to computer terminals, he or she could probably come up with something that the classroom teacher would be able to implement successfully.

Teachers should probably be made aware that since ERIC-CHESS Clearinghouse has combined with the Social Studies Development Center at Indiana University, an incredible amount of data is available. Plus, this institution has added a leadership function, so perhaps my hope in the previous paragraph has already been answered.

Obviously, students need to know how to find the information they seek, not only what it is, but where it is. This is a major task facing any social studies teacher today, access to computers or not.

With the Oregon Department of Education thinking about forming a Social Studies Cadre and developing a Rationale statement for the common curriculum, we hope our own state will give us a little guidance in this area, so we don't have to go to Indiana to find out what's going on.

Position Paper
Fred Crisman
Willamette High School

I am a secondary Social Studies teacher and career counselor at Willamette High School, which is located in the Bethel District. After teaching for two years in the Bethel Night School Program, last year I began teaching one United States History class to juniors and two World History classes to sophomores in the day school program, which I am doing again during the 1987-88 academic school year.

During the past year of teaching Social Studies, I asked myself several times—"there must be a better way!" Of course, I was referring to the task of teaching history to high school sophomores and juniors who seem to constantly question the idea of studying the past. As a result, I found myself returning to college this summer and fall hoping to find a education class that would truly help me in the classroom during the upcoming year.

Before this year, my computer experience included twelve hours in the business application and basic programming of computers, mainly on Apples and a little time on an IBM PC; in addition, I taught basic programming on the Commodore 64 in the Upward Bound Program during the University of Oregon's summer term.

However, this course and a summer class, *Computer Applications to Reading Instruction*, have caused me to reevaluate my attitude toward using computers in my curriculum. Although overwhelmed by the tremendous amount of information in the courses, I was excited by the enthusiastic, innovative ideas concerning computers and education that were shared by my peers and instructor. I mentally questioned portions of my curriculum that I knew were weak and failed to adequately meet the desired learning goals during the past year. These are the areas where I feel incorporating computer assisted instruction (CAI) and/or computer managed instruction (CMI) may help my students and me!

The curriculum areas I hope CAI and/or CMI will help to improve are simulations, using statistics, and study skills. I will evaluate each area by considering three important questions:

1. What are the weaknesses/gaps in the present curriculum?
2. How can the instructional capabilities and the information manipulation techniques of the *AppleWorks* program improve the current processes being used in my classroom?
3. What capability should I use first and how should it be incorporated into the classroom?

In order to effectively answer the above questions, I will closely examine the goals and objectives of the courses, world history and United States History, which I teach during the year.

Hopefully, the introduction of new strategies and the use of software innovations will increase the interest level of the students; consequently, their academic performance and problem-solving skills will improve, and my frustration will decrease. My personal goal for the upcoming school year of 1987-88 is to incorporate both CAI and CMI into at least ten percent of my curriculum.

WORD PROCESSING

As a new teacher in the day school program, I quickly found that the University of Oregon never prepared me for the problem of make-up assignments for students who have been absent. It quickly became a major pet peeve that required me to hold back sarcastic replies when students asked, "Did we do anything important the last two days while I was sick?" Guest speakers, class discussions, and lectures are nearly impossible to duplicate with the same effectiveness on paper. However, I am going to try using *AppleWorks* word processing program capabilities to communicate the critical concepts the students are going to miss—if after taking the workshop, I find some feasible techniques and applications of the program.

In addition, the note-taking skills of most high school students are less than satisfactory; consequently, I give them a blank outline to keep them in step with me while I cover important concepts verbally and on the chalk board. I find that hearing and writing the information increases their retention and understanding of the data. I hope I can put the major portion of my critical lectures in text form on the *AppleWorks* word processor program that will be available in the media center, which has open computers for student use during study hall, noon and before school. On his/her own time, the student will have to move through the material and extract the major points in order to fill in the blank outline. Once I learn the operating instructions and basic steps of *AppleWorks* , I'll decide if the time spent initially working with computer-inexperienced students will be cost effective, but I've also thought of peer tutoring on the keyboarding and program working skills. It may not be effective, but I will only try it with my most important lectures. My goal is to create a strong sense of organization that anticipates and judges the information that will be required and good reading skills to reorganize and summarize the data. I have played around with a couple of other word processing programs to find out which one is the most user friendly or student friendly and teacher free. I found *Bank Sreet Writer* too cumbersome, *Apple Writer* seems to work, and a couple of public domain programs were too simplistic. I also want the capability of being able to use a cloze technique, text with a fill-in where students have to read for context, because the student will be able to infer material already discussed.

DATABASES

First, an instructor does not need to have a computer for every student, nor even a computer in the classroom. It works well to just use the computer to manipulate the information into some meaningful form or arrangement, and then printing a hard copy to be Xeroxed for students to read and gain a basic understanding for discussions. A wonderful characteristic of computerized data files is the ability to update the information quickly and easily; moreover, you can have the students research the material and then enter it in the computer—I caution against the students' participation in data collection and entry unless the collection requirements are clearly defined.

Second, using small or large groups in front of a computer, you can rearrange data based on suggestions and requests form the students. One of the database's handiest features, a sorting capability, allows students to manipulate their data in all sorts of ways. The students may not find the answer to world hunger, but they will see a definite correlation between GNP and life expectancy or mortality rates and industrial capacity. In addition, I believe their input and decisions on how to rearrange the data will create a higher degree of interest; consequently, a higher degree of learning should occur.

Third, combining the text with computer work is one more tool, a powerful one, a teacher can use to motivate students. Hopefully, it should allow for more individualization by giving the information to the students in a form that they can control. Furthermore, it creates a sense of gathering information from another source rather than just the text and encyclopedias.

Finally, two points that I feel are very important: when using hard data, insure it has a meaningful impact through a thorough evaluation that requires a student to "think through" the material, and be careful not to oversimplify the information. A major issue I hope to communicate is—do not always be impressed by numbers, you can do almost anything with statistics.

SIMULATIONS

Simulation and the improvement of study skills (which includes test taking skills) are the major educational concerns I believe the computer will be able to fulfill for me in the classroom. Programs, such as *Oregon Trail*, and *U.S. History* allow a student to learn of the consequences of alternative choices without having to suffer the actual results. A good program stimulates a person into anxiously waiting to read the next set of alternatives or results after having selected an earlier one. However, as it has been repeated in class discussions, the students must be led to the "what if" reflective process that makes a simulation an effective learning strategy. The little I've seen of computer and student interaction has left me with a feeling that the student plays to win and merely makes choices to improve his score through trial and error. This feels to me to be a video game attitude that allows a player to die over and over without asking him "how he feels?" or "what about your parents' feeling?" Moreover, in the computer lab, the student even loses the financial risk of a quarter resulting in even less thought about his choices in relation to the outcomes.

Finally, study skills and other activities (word processor, classroom memos, etc.) are excellent if you have enough terminals to service even several small groups of students in your classroom. The nonthreatening, nonjudgemental tutor is perfect for challenging students outside their comfort zone; consequently, I have seen extremely shy students that would never answer an oral question in class, in front of their peers, carry on a question and answer dialogue with a computer. However, the process was one-on-one and even in small groups certain students always become the decision makers—it was evident in our own class when we were examining software that certain people seldom made a program decision except when working one-on-one. I believe it still breaks down into dollars and cents as to whether a computer can be used effectively in direct instruction. Unless you have a ratio of at least one terminal for every three students, it would be impossible to incorporate the many wonderful ideas expressed in the class; however, at this point in my teaching career and with the resources my school district has to offer, computer-managed instruction will be a major goal of mine in the 1987-88 academic year.

TERM PROJECT

Patrick K. Dolan
Lincoln Jr. High

CHANGES THAT NEED TO BE MADE IN SOCIAL STUDIES EDUCATION IN ORDER TO PREPARE TODAY'S STUDENTS FOR THE INFORMATION AGE.

Changes should be made in Education in general, not just in social studies. Rather than trying to develop ways of helping students only in one curriculum area, changes need to be made across the board, and top to bottom.

In my district, for example, a commitment was made to make all students computer literate. Computer labs and classes were set up at each of the elementary schools, and staff members were trained to teach the children about computers and how to use them. The next step was to do the same at the junior high. The only problem was that as students became computer literate and able to use computers, there weren't any machines to use outside the labs. If computers are going to be put in the classroom, teachers are going to have to be computer literate. The district set up a series of inservice workshops to make all district teachers computer literate.

Today, two years after the series of workshops, there is a computer lab in each of the schools. The high school business department has an additional lab. Most elementary classrooms have computers in them. But the junior high school and high school have only one or two for each department, and teachers in those schools have forgotten much of what they learned, because no computers have been put into their rooms for them to practice on and to progress in their computer education.

The point is that in order to get students ready for "living in an information-rich world," you must first get the teachers ready by training them and making sure they have *continuous* access to at least one computer. Teachers should be given programming training, so they can better understand and use their equipment. Once staff members are trained and competent, they will be able to help students get ready.

One way social studies could be changed is by having a district-wide Bulletin Board System (BBS). This would enable students to get a feel for the use of telecommunications, and many interactive programs could be set up between schools. For example, an inter-elementary quiz game could be set up similar to College Bowl. (In fact, it would be great to have a state-wide, or even a Nation-wide system for that type of competition on all levels.) Students could do community historical research, compiling data in a local database, etc.

By the time students got into the junior high, they would be familiar with the concept of a database, making it easier to use a database program, or develop a more complex one that would enable the teacher to develop the students' higher-level thinking skills.

I think that each social studies class should have at *least* one good database to work with and a simulation or two. Only by constant computer usage and availability will we be able to develop the confidence and interest necessary for students to understand the methods of use and access of the tremendous amount of information available.

If each secondary school library had a hookup with a large database (such as CompuServe, or a State Library), junior high classes could be taken to the library, and by using a large screen projection device, they could be introduced to the world of "mass information" communication. By the time students were ready to graduate, they would have learned to use the system to research their senior comp. papers, compile reports, and generally improve their knowledge.

WITH *MY* CURRENT LEVEL OF ACCESS, WHAT THINGS CAN *I* DO *NOW*?

I can continue to let kids come in before school to "play" on the computer. This enables them to maintain interest and competence in computer usage.

In my History class, I can continue to use the Oregon Trail Simulation, and as soon as I feel able to work with a database, I can have my students start to build a U.S. history database. The actual building of a database will teach the students the "facts" and also teach them how to use databases to find information. By using inquiry-type questions, students will increase their levels of thinking and the grasp of the "facts."

The District has a program library, but the limited free time at school has prevented my checking out the various programs to "play with" to determine which ones might be valuable in my class. As a result of this assignment, I took time to browse the catalog and mark several programs to look at during my preparation period during the next several weeks. I will attempt to inform my fellow social studies teachers about programs that seem especially useful

In Career Ed. I can continue to introduce students to MICRO-CIS (a Career Information System designed for use on a microcomputer) by having them use the MICRO-QUEST program. When they move up to the high school next year, they will have a basic understanding of how the MICRO-CIS program can be helpful to them.

Another thing I can do is to encourage students to type reports using *FrEdWriter*. Besides helping them stay computer-familiar, it should show them that a computer can be used for something besides retrieving data and playing games.

Finally, I can continue to educate myself about programs, work on learning to program simple simulations, and try to find a way to afford a computer, so I can have unlimited access to do the things I think are necessary as a teacher to help my students.

Computer-Integrated Instruction Inservice

Position Paper

Suzanne Bolton
Madison Middle School

In order to prepare my students for an information-rich world, I feel that I have taken a first step. Taking this Computer-Integrated Instruction Inservice has helped me to begin thinking about social studies curriculum, as well as other disciplines, with a different perspective.

Even though I may be struggling with the logistics of facility and equipment, I presently feel that I can integrate several units about the computer age into social studies classes: 1) Students will collect current events articles dealing with society's use of the computer. Discussions of uses, consequences, and predictions of future uses will be derived from these reported events. 2) Students will participate in a simulated marketing survey. The results will then be entered into a database, utilizing the categories of the questionnaire. Pros and cons of these surveys will be considered. 3) Students will interpret map legends of natural resources, manufacturing, climate, etc. to build a database to compare and contrast various countries. These ideas seem safe; however, they will allow me to get my feet wet or test the waters.

I have started a project with my talented and gifted language arts class. (I do not teach the talented and gifted social studies class, or I would have used this project with them as part of another unit of study.) I have asked these sixth-grade students to consider a world problem and to list factors or reasons (or categories for the database) why certain countries may or may not have the problem which they have chosen to research. I have asked the students to gather data about those countries that are known to have the problem and those that are known not to have the problem. Students have collected data from the library; however, I have needed to assist them with suggested factors, as they assumed that the major problems of the world were much simpler than they are. This may be due to a lack of background information and to a lack of understanding of how this information will be used. I feel that I should have given them an introductory experience of seeing a database work with data already entered, as we did in class, before expecting them to try out their wings. I feel that I am learning from this experience; however, I am not certain that this year this project will be very effective. We are now ready to enter our data.

In the near future I plan to integrate simulations into my social studies classes. I will build units around the themes chosen using an interdisciplinary approach. Secondly, I have students in my classes who can gain much, I believe, from map-skills tutorial programs. I see that students need to learn to use the computer as a tool to construct graphs, time-lines, and other visuals. These are skills appropriately taught in the social studies class and may very likely be used by students for a lifetime. I would also like to do some interest, attitude, and personality inventory testing utilizing software that may already be available or by making our own tests. I have not yet entered class rolls and grades onto a disk. I know that this is a must in the future and will be a time saver; I am sure that I will do this at the beginning of next term.

In order to accomplish my future goals, I must consider the facility availability, the equipment accessibility, and the training needed to insure for success and future stress reduction. As I have mentioned before, logistics are a bit of a problem. It is difficult to schedule my classes into the computer lab. Conflicts arise due to explore classes, word processing lab needs, and special computer classes. At our particular school, a "schedule of use" is difficult to find. It seems that unless there is another lab (more computers are purchased) that prioritizing computer needs may be required. How does one prioritize need? Scope and sequence? Another problem is that the lab is on the other side of the building, which means that either I need to take a total class or not go at all.

Disks are also hard to find at my school, but will be purchased by our sixth grade team's budget if necessary. I have requested a computer to be located in my room since lab time is very difficult to obtain presently. I will have a computer in my room for three weeks—possibly longer (especially if its location is forgotten).

I have learned that I can ask the principal's secretary to allow me to use the VAX to obtain access to Magladry's software list. I have also learned that $1,000 TIP grant money is available for some projects throughout the district. I plan to write a grant for some simulation software to be kept and used at our school. Do you want to help write the grant? These have been some of the problems that I have needed to work through thus far.

Training for teachers in this district might include 1) An inservice to survey software and to learn about easy access to Magladry's software; 2) Methods classes to teach process of integration of the computer into the classroom. Perhaps my frustration with my database lesson would not be present had I had a class in the process of integration instead of a trial and error method, although I am finding my trial and error procedure interesting! 3) An inservice discussing or problem-solving the concept of computer sharing—"The ultimate plan"; 4) Readings and sharing of ideas such as Beyer's article on the critical thinking process; 5) An inservice teaching on how to use the computer to make predictions with classes; 6) Development of a curriculum for integrating the computer into middle school curriculum. If I were writing a curriculum, I would incorporate Beyer's critical thinking process with Sandra Kaplan's interdisciplinary theme approach to curriculum development. I believe that it could be done effectively.

I have appreciated this class and, once again, realize how important it is that I keep up with current trends in the theory and practice of education. Perhaps another need, and certainly a benefit, would be to have the month of January free for directed independent study for teachers and students throughout the district. I need to read the current literature. This would afford the opportunity to read and to develop curriculum.

Thank you again.

COMPUTERS: A PERSONAL REACTION

by

Gail Nelson

Churchill High School

Computers are changing the world. One only has to look around to see their impact on how we access information, from the local library to airport terminals. Schools at all levels are also being changed by computers. At Churchill High School, I see this from the attendance office to the manner in which I receive assignments from my students. Changes will obviously need to be made in social studies education in order to prepare today's students for the information age, and as a social studies teacher I will need to be part of that process of change.

Churchill's Computer Use Committee has been active in an attempt to coordinate the use of computers in the school. According to the committee's recommendations, "The first priority for computer use is teacher use. Teachers set the example for students. To this end the committee recommends that powerful computers be available in each department office within easy access of every teacher and that each lab have available upgraded computers for staff use."[1] Further, recommendation is made for computer inservice/workshops for staff.

As a teacher at Churchill, I feel it my obligation to keep abreast of computer developments by personally using the computer when possible. To that end, and because I am raising a middle school student to enter the "Information Age," I have an Apple IIe at home and use it regularly for word processing. I want to further explore the use of my home computer with household accounts, stock market records, etc. If I integrate the computer into my life as a tool, I can better help my students and my son prepare for the rapid changing technology that computers promise. Further, I feel an obligation to attend workshops, such as the National Science Foundation one. It is difficult when in the midst of teaching to keep up on developments in all areas, and workshops are attractive for that purpose. In addition, I need to be previewing software that can offer me help, either in preparing classroom materials, recording classroom activities, or teaching in a more meaningful way. I have visited the district software collection at Magladry Center and need to continue to do so in the future.

Churchill's Computer Use Committee further recommends: "The next priority is student use. Students should have access to computers every period of the school day and the school should provide a staff member to help students with machine use and software questions."[2]

Just having finished collecting research papers from my regular U.S. history classes, I am evaluating how I might integrate the computer as tool into that process. I would like to take advantage of a computer lab in the future and require that the papers be word processed on the computer. As a former English teacher I spend a great deal of time in evaluating research papers and their organization or lack thereof. If students could save their papers and fairly painlessly move around their copy, they could better visualize and find solutions for organization problems. Thus they would have a better final product and feel more successful in the process.

Churchill's Computer Use Committee has recommended: "The third priority is instruct- ional use. In lieu of having a set of computers in every classroom, teachers should have access to a computer lab where they may take their entire class when needed."[3] In addition, the report recommends that computers should be available for period by period check out for teacher classroom demonstrations, and that the school should purchase at least one "PC Viewer" for demonstrations. Even with spending restrictions, it would seem that the facilities exist or will soon exist at Churchill to allow integration of computers into the social studies classroom on a regular basis.

The question then becomes, to what extent do I want to utilize the computer in my teaching? Candidly, I am not ready with an answer to that question. As a teacher of Advanced Placement students, who must prepare to pass the AP test in order to receive college credit, I have wanted to develop a tutorial review that my students could pursue independently in our resource center. I would like to find a program that allows me to write multiple choice questions covering material that we have covered. I would want the program to repeat questions a student misses at the end of each review segment, and to allow the recording of answers so that I could review progress. I have previewed several programs, but either I couldn't understand how they worked within the time I could allocate to the preview, or found the programs not able to do what I desired.

Through this workshop, I have developed an interest in using databases in my teaching. I will have to do some thinking about this, but I would like to have students create their own databases so they can see how data is structured. I would also like to network with other social studies teachers using databases in their classrooms, and make visitations to observe students and teacher interacting with computers in the classroom setting. The biggest obstacle to my pursuing this interest is and will be time. I find that I have little additional time left after the preparation and follow-through involved in my day-to-day teaching. (For example, I find that the time I am taking to write this paper is robbing from the time I need to wade through a few more of the sixty research papers that await me on my desk in the study.) Still, I am hopeful that more and more databases will be commercially available, and that our school will in the future be networked into large-scale databases. Then my energies will be devoted to helping students develop critical thinking skills with the help of databases, rather than having to build the databases themselves. At least, I am now thinking about how to approach this area, rather than being unaware that it exists.

Since we have an eight-period day at Churchill and since we have resource centers available for students when they are not scheduled in class, I am interested in the possibility of using the computer not only in the classroom but in this setting as well. Simulations that would take large blocks of class time could perhaps be handled with a combination of the class and resource center. Simulations do have potential for greater involvement and development of creative problem solving, and I will continue to preview simulations and evaluate the time necessary to successfully integrate them into the classroom versus other classroom instruction that would be lost by their use.

One area that I do think I want to integrate into our curriculum is a unit that deals with the dangers as well as the promise of technology. I can't help thinking about the unit I am now studying with my AP students, the Industrial Revolution and the social problems that arose as the U.S. went through this period. Were Carnegie and Rockefeller industrial statesmen or robber barons who must be held responsible for many of the social ills of their time? Future students will no doubt be studying the social problems that are arising from our transition into an "information society." Those who have information will be more "fit" than those without, to use the social Darwinist frame of reference from the Industrial period. How those with information use it will determine the extent to which social problems arise. Will the great masses of information that are now available broaden the divisions in our society or bring us closer together? It should make a good discussion.

Computers are here to stay. To deny that would be to stand still when all else is moving forward. The task and challenge is for me to make thoughtful decisions about how I can use the technology to do a better job in the educational setting. I would be dishonest if I said that this workshop has given me the answers, but it has helped prepare me to ask better questions. For that I am grateful.

NOTES

1. Churchill Computer Use Committee. (1988, February). *Computers at Churchill High School—Recommendations by the Computer Use Committee*. p. 3.
2. Ibid., p. 3.
3. Ibid., p. 4.

Term Project
NSF Social Studies Inservice
Position Paper for Monroe Middle School
Pam Grace, Lois Pleasants, and Susan Harris

In an effort to organize our thoughts and include all of our social studies curriculum in grades six and seven, we divided this paper into four parts: What students need to know, what teachers need to emphasize, what can we teach in the future, and a future wish list.

In introducing the computer as a tool in the classroom, we feel students will need to become more proactive learners. Instead of teachers constantly giving out information, and students receiving it and giving it back (as in test answers, some discussions, etc.), students will need to develop many talents that they aren't using now. They will need to learn how to ask questions in order to obtain the information they want. They will need to learn how to discriminate between essential and non-essential information as there will be an incredible information glut. They will also need to know how and why to find information and what the computer capabilities are. Our building plan includes six weeks of computer instruction in the sixth grades and keyboard competency by the end of the 10th grade, so students will need to be working on this basic skill area. Finally, it will be imperative for student to realize that although computers will help to keep up with the latest information, computers and technology will also be in constant change, and they will need to keep current with the newest technologies.

The change for teachers may not be so drastic. The teaching strategies will need to emphasize skills to enhance the proactive learning style. They will need to teach critical thinking skills such as analysis, synthesis, and application of data to the "real" world. However, teachers will need to keep emphasizing the basic skills of reading, writing, listening, and speaking because computers are only a tool. If a student can't read, question, react, or answer, the data on the screen is useless. The operator needs to generate the ideas and operations. A tool is only as good as its user. Teachers will be modeling strategies for learning and applying the skills. For example, in a history class, we would help students gather and analyze data and teach them to look at trends to make predictions of our future.

Another essential skill to teach will be the process of identifying the problem, gathering and organizing data (from the grant information banks available) then solving the problem. This may not be any different than what we are teaching now, just a different tool and faster, easier access to the information. Because of the tool, it will be the teacher's responsibility to teach the terminology and basic use of each software program. It will also create new field trip experiences for students to see its uses in the "real" world. It will be important for teachers to show all of its applications, now and in the future.

Finally, it will be the responsibility of the teacher to show the students they are the thinkers, to teach students to determine the validity and accuracy of the information, to make students questioners instead of acceptors, and to teach responsibility of use and morality of the computer.

Monroe's future plan is idealistic and expensive. We feel this is an area where we are in the greatest need. Our program has been built on basic skills and meeting individual student needs, but we have failed to provide computer-use time for most students. Therefore, our first goal would be to provide more computer time for each student. Right now it is a 6-week required course, and most students never see the computers again. We would begin using word processing in our writing/language arts classes to facilitate the whole writing process and use it at all grade levels. Then teachers would begin to assign projects and reports to be done on the computer, so students could maintain their keyboarding skills and increase their computer-literacy. Students would use word-processing for recording the results of their work. Teachers and students would begin to build databases for our particular curriculum so we could develop our own research projects, simulations, etc. There would be more time for practicing and applying skills learned from the book. Practicing longitude and latitude problems, for example, would become a realistic game with the right software. On a much larger scale, we would use computers to make connections to the outside "real" world. We would establish a modem to the Library of Congress and other reference facilities so the students would have the most up-to-date and complete information available. We would connect with students in other regions of the U.S.A. as well as other countries so students could link ideas and hypotheses outside their frame of reference and point of view. And in an effort to increase student relevancy to the curriculum, we would establish mentorships so students could ask questions of business people, professionals, etc.

Our future wish list is on a grand scale—but we are, in essence, just trying to catch up. We are proposing a computer for every pair of students in block (language arts and social studies combined.) Also, we would like two computer labs of 30 computers of compatible models and the accompanying software for each student. These computers would be used for individual projects; before and after school; make-up work, etc; regular teacher training to receive updates on the new technology and systems available; and regular student inservice training. We would like time to review software and time for preparation for the new material. We would like computer aides in the classroom, who could be students given special training, to assist us with the glitches and questions that always arise. This technology would benefit our program and individualize it, perhaps on a greater scale than we are doing now. Projects and software would be at appropriate levels, and students in pairs would problem solve at their own tempo.

It is a grandiose dream which we would love to share with students. To be aware of what is available, the possibilities and the many benefits to students and staff, makes us want to campaign harder for what we feel will become a necessity to schools of the future.

4.8.5 Materials

This section should include handouts and/or an outline of various telecommunication systems that may be useful to the educator. These systems are continually being updated and change rapidly, as do the cost for using them, so the information should serve only as a general guide and not as a definitive reference. Because of this, we have included only two sample entries for the handout.

Telecommunication Systems for Educators

COMPUSERVE

- Starter Kit (Includes some free connect time) Costs $35.00
- Connect Rate Charge $6.00 (300 Baud) $12.50 (1200 and 2400 Baud)

OREGON STATE LIBRARY

- Catalog is Online
- Oregon Index: Bibliographic references on Oregon newspaper articles
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- Local phone call for government agencies and libraries in larger cities; available in rural areas later
- Available 24 hours a day; 7 days a week

4.8.6 Readings

The "Readings" sections of this Notebook are designed to supplement the materials presented during the inservice sessions. This bibliographic list contains a number of good articles on thinking, problem solving, and higher-order skills that can be included in the readings. All of these references have been chosen to fit the needs of social scientists.

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1 a : producing a decided, decisive, or desired effect b : IMPRESSIVE, STRIKING
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INSTRUMENTS AND EVALUATION

5.1
Evaluation Overview

Rational for Evaluating Inservice Programs

The planned outcome of many inservice programs is a set of changes in attitude or behavior. While formal evaluation provides staff developers with a useful tool in planning, designing, developing, and implementing of staff inservice, "systematic evaluation of inservice programs is the exception rather than the rule" (Gall & Renchler, 1985, p. 28). The literature survey conducted by Vivian Johnson (1988) for her Ph.D. dissertation indicated that very few inservice projects are adequately evaluated either while they are being conducted or after they have been conducted. That is, very few inservice facilitators gather data that could be used to judge the effectiveness of their work.

There is a substantial literature on effective inservice practices. In addition to Johnson (1988), a good starting point for the novice student of this field is Wade's (1984-85) meta-analysis of 91 inservice studies. There is a very substantial bibliography in Joyce and Showers (1988). A number of effective practices identified by Stecher and R. Solorzano (1987) are listed in Table 1 given on the next page.

Evaluation studies provide staff development personal with a mechanism for judging the effectiveness of a program. The evaluation processes is divided into two components: formative and summative. A key point to remember is that the development of formative and summative evaluation plans should always occur in conjunction with the planning, design, and development of inservice programs.

Formative evaluation concentrates on measuring the immediate success of the program. It begins with a needs assessment. Then as the project continues, it provides feedback for the improvement and development of the ongoing activities. Goals of a formative evaluation include:

1. Developing a permanent record of conditions prior to inservice. (This use also needed for summative evaluation, since it provides a baseline for measuring change.)
2. Determining staff development required for improvement of the school, curriculum, etc.
3. Ensuring the inservice program is implemented as effectively as possible.
4. Identifying unanticipated outcomes.

Of the objectives listed, developing a record of pre-inservice conditions is typically eliminated from evaluation plans. This occurs because plans for formative evaluation are neglected until inservice is about to be implemented or is in progress. But without a record describing the pre-inservice conditions, it is difficult to determine the type or degree of change that occurs during and following an inservice. This impacts judging the overall effectiveness of a program (summative evaluation), especially when the expected outcomes of an inservice are changes in participant attitudes, behaviors or values.

While formative evaluation is valuable, it provides little insight about the factors that affect institutionalization—that is, long term acceptance and implementation—of a change (Fullan, 1982). To determine the long term changes that are maintained following inservice requires summative evaluation. Summative evaluation is also used for accountability, certification, selection or continuation of an established program. It concentrates on measuring the **residual effect** of the program over time (6-12 months or more after the project has ended). Unfortunately, summative evaluation is typically neglected.

Table 1: Effective Computer Inservice Practices

1. Extensive practice with computers.
2. Comfortable and relaxed atmosphere.
3. Appropriate balance between lecture and guided practice.
4. Individual attention.
5. Knowledgeable trainers.
6. Detailed curriculum guides and lesson plans.
7. Clear and relevant objectives.
8. Lesson-related materials and handouts.
9. Inservice lessons linked to instruction.
10. Peer interaction.
11. Voluntary participation.
12. Strategies for teaching heterogeneous classes.

From *Characteristics of effective computer in-service programs.* by B.M. Stecher and R. Solorzano, 1987, Pasadena, CA: Educational Testing Service. Copyright ©1987 by Educational Testing Service.

Why should you be interested in the residual effect? After all, formative evaluation can be designed to measure specific content, skills, or instructional strategies learned by participants during the inservice. But, unfortunately, research indicates that knowledge, behaviors, and skills acquired during inservice are seldom transferred to classroom situations. The problem is that without examining the residual effect over time (longitudinal formative or summative) you are unable to determine the overall effectiveness of your inservice program.

A major goal in summative evaluation is to produce accurate descriptions of the program along with measures of its effects (i.e., changes in participant attitude or behavior). These descriptions are valuable for a number of reasons. Typically the program description includes estimations of program cost and helps decision makers determine if the program is worth continuing based on its costs. Program description can also serve as planning documents for people wanting to duplicate the program or adapt it to another setting. Program descriptions also document where you started from, your current state, and where you want to or plan to go. Including descriptions of where you plan to go ties summative evaluation to the first stage of formative evaluation, the needs assessment process.

A final and neglected use of evaluation is for improving recycling of inservice programs. Many inservice providers present their inservices several times per year over a period of years. Keeping track of what presentations go well, what software is useful and the needs of those in the workshop make it easier to improve the next cycle.

Stecher and Solorzano (1987) identify two problems that result from the lack of evaluation research. One, without evaluation research it becomes difficult to judge the relative merits of inservice programs (summative evaluation). Two, without evaluation research, developers have little data to guide them in developing new programs and improving existing ones (formative evaluation).

Planning for evaluation encourages developers to operationalize the goals, objectives, and outcomes of an inservice program. The process of operationalizing encourages developers to divide the change into smaller pieces thus avoiding the pitfall of trying to accomplish a complex change in one step. Evaluation is a constant reminder that change is difficult, complex, and takes a long time.

Current State of Computer Inservice Evaluation

A review of the literature indicated the majority of computer related inservice is not evaluated. When evaluation does occur, it is usually on a small scale and is "one shot," taking place during or within several days of the inservice. The most frequent evaluation goals are determining modifications required for program improvement, making quantitative judgments of whether inservice occurred, and validating that funds were spent on the development and/or initiation of the proposed program or course.

The two most frequently used criteria for measuring the quality of an inservice program are:

1. Changes in participant attitude toward computers.

2. Changes in participant computer literacy or knowledge/skills about particular aspects of using computers.

The selection of these criteria is based on the notion that as participants develop a higher level of computer literacy and knowledge/skills, and positive attitudes toward computers, they will increase their classroom use of computers. *The limited research does not support this notion*! This is a very important point. An inservice can be quite effective in increasing teacher knowledge and skills in the computer field, and have little impact on the teacher's students.

Studies by Vockell & Rivers, 1979, Mitchell, 1986, and Van Walleghem, 1986, suggest that positive attitude toward computers and computer literacy does not have much to do with classroom use of computers. The longitudinal follow-up completed by Vockell and Rivers (1979) indicated that participants completing an introductory computer course subsequently tended not to use computers in their classrooms. Subjects attributed their non use of computers to lack of access rather than a lack of knowledge on how to use them.

Two studies addressed the relationship between changes in teachers' willingness to use computers following inservice and actual classroom use of computers (Mitchell, 1986; Van Walleghem, 1986). These studies indicated that while teacher willingness to use computers increased following inservice, this willingness did not correlate well with actual computer use in the classroom.

Planning to evaluate a computer related inservice

The evaluation of a computer related inservice should be designed to measure the extent that inservice objectives were achieved, identify problems associated with implementing the inservice objectives in the classroom, and measure the long term effect of inservice objectives on student achievement. The evaluation plan should contain two phases, formative and summative, with approximately equal amount of time and effort allocated to each.

Summative evaluation should focus on:

1. Participant knowledge about computers. (Is there a change that can be attributed to the inservice?)
2. Participant attitude toward computers. (Is there a change that can be attributed to the inservice?)
3. Participant instructional and professional use of computers. (Is there a change that can be attributed to the inservice?)
4. Changes in the instructional use of computers by the students of the inservice participant. (Is there a change that can be attributed to the inservice?)

Pre and post questionnaires are effective instruments in measuring changes in participant knowledge and attitude, but remember that increased willingness to use computers does not correlate well with actual computer use in the classroom. If the goal of your inservice is to increase classroom use of computers, your evaluation plan must use additional criteria besides changes in participant knowledge and attitude.

Longitudinal evaluation is the only way to determine if sustained changes in classroom use of computers have occurred following inservice. The evaluation should use of a multi-method approach, including both quantitative and qualitative measures. The multi-method approach helps expose the numerous factors (access to computers, lack of administrative support, teachers not seeing a value in the innovation, etc.) that inhibit or prevent teachers willing to use computers from actually doing so. Measuring changes in classroom use of computers requires base line data on instructional use of computer use prior to the inservice. Changes in computer use that occur during formative evaluation are insufficient to judge the extent of computer implementation in the classroom. It is necessary to use longitudinal, summative evaluation techniques to see if gains made during an inservice program are sustained.

Summative evaluation also serves other purposes. Plans for longitudinal evaluation are evidence of an institution's long term commitment to implementation of the innovation (it simply is not going to fade away). Identification of factors that impact on the residual effect of inservice can facilitate making changes in the culture and organization of the school necessary to maintain the innovation. Fullan and Pomfret (1977) believe the main problem in implementing curriculum innovations is "that curriculum change usually necessitates certain organizational changes, particularly changes in roles and role relationships of those organizational members most directly involved in putting the innovation into practice. ...Often the organizational (role relationship) change aspects of curriculum projects are left implicit in the plans (p. 337)." Longitudinal evaluation makes explicit the organizational and cultural changes that must occur for computers to become an everyday instructional tool. Only when these changes are made explicit can they be addressed in an overall plan for staff development.

Selection of an evaluator

In an ideal situation the use of an outside evaluator to assist in the planning, design, and development of an inservice program is highly recommend. This is especially important if the inservice developers have little experience with evaluation and/or if the inservice is to be presented more than once. An evaluation expert can anticipate generic problems associated with the evaluation process and help train inservice personal in the development of an evaluation plan.

An unfortunate reality is that many inservice projects may not have the resources to obtain the services of an external evaluator. This places the evaluation component in the hands of inservice developers. If inservice personal are unfamiliar with evaluation process, they should solicit as much help as they can from experienced evaluators. It is recommended that the draft evaluation plan be submitted to an external evaluator for review and comment, even if the external evaluator cannot participate in the development and implementation process. No matter who ends up planning and conducting the evaluation, the process should occur in conjunction with the initial planning stages of the inservice.

Role of local evaluator

The primary role of the local evaluator is to gain consensus on the decision to evaluate, and to plan and implement the evaluation. When planning the evaluation, it is necessary to gain administrative and participant support for the process. Typically this requires persuading people of the value of evaluation and dispelling its negative image. A large body of research supports the need for continuous evaluation of any change effort (the change process, models of effective staff development, and innovation and implementation attempts).

Gaining administrative support is especially helpful, particularly when additional resources are required to conduct the evaluation. Participant support is critical and cannot be taken for granted. Prior to the inservice—that is, during the needs assessment interaction with potential participants—discuss the value of evaluation in helping to judge the reasonableness of inservice objectives, in assessing reasonable timelines for integrating computers in the classroom, for assessing the extent of resources necessary for this change to occur, and for helping administrators keep in touch with the actual realities of a classroom situation. Remember that participants may be distrustful of the evaluation process, so try to allay their fears. Creating an atmosphere conducive to evaluation should occur with planning what to evaluate.

Evaluation objectives and topics

Inservice evaluation should address the content of the inservice, the presentation of the material (that is, the quality of work being done by the inservice facilitator), changes in the participants, and impact on the students of the participants. Impact on students is the most difficult to determine. It should not be attempted on a formal level (summative evaluation) until a certain predetermined level of classroom computer use is documented. That is, measuring the impact on students of a computer inservice for teachers, is a complex and demanding task. It requires careful collection of baseline data (where the students are at the beginning with respect to the types of changes being fostered through the inservice).

Computer inservice is a new area. Little agreement exists among educational computer experts as to the most appropriate scope and sequence for computer related inservice. The small body of existing evaluation research is helpful in guiding the planning and design of computer inservice, but there is a word of caution. Use the research as a guide, but also tailor the inservice content to reflect the unique nature of your school district, and its long and short range computer goals. Ideally, inservice would be closely tied to carefully developed plans for instructional use of computers in schools that have been developed by the schools and districts of the educators who will participate in the inservice. The planning process is part of the needs assessment effort.

Formative evaluation occurs simultaneously with the initial needs assessment, the initial planning, and the actual conduct of the inservice. A growing body of literature on effective inservice practices and effective computer inservice practices is starting to surface (refer to Table 1). Inservice developers should use this limited research to guide their development of inservice delivery systems. Practitioners can also help the field of educational computing by making systematic studies of which techniques are the most effective and under what conditions.

Table 1 lists a number of possible areas for formative evaluation. That is, the inservice facilitator may decide to implement a number of the suggestions given in that table. Formative evaluation can help the facilitator to determine how well such a decision is being implemented.

Formative evaluation prior to and during the inservice measures how well the content met the current needs of participants. Longitudinal formative and summative evaluation determines when specific inservice programs are outdated and new ones need to be developed. It is important to remember that the goals of computer education are changing. The direction and content of computer related inservice will require careful monitoring to ensure it meets the needs of teachers, and is continually updated to reflect changes in the field.

Determining the content of a computer inservice typically begins with a needs assessment. The needs assessment process can be viewed as a special type of evaluation. The goal of needs assessment is to describe what you want the final state to be, assess the current state, and determine if their is a discrepancy between the two. If a discrepancy exists, intervention is necessary. Inservice is a common component of the intervention process.

The introduction of any innovation requires an assessment of the staff skill level with regards to the innovation, staff attitude toward the innovation, and the characteristics of the school climate that impact on implementation of an innovation.

A formal formative evaluation plan typically includes pre and post questionnaire's to determine participant knowledge and attitude. This approach is quick and efficient but lacks descriptive detail, provides little evidence on participant computer skill level, and provide little insight into the problems teachers face when trying to use computers in the classroom. Combining questionnaires with informal approaches results in a richer description and may identify unanticipated problems or concerns. Informal approaches include engaging staff in informal conversations and structured interviews, attending staff meetings, and talking with administrators.

Assessment of participant initial skill level is both a delicate issue and difficult. Most inservice teachers object to the idea that they might be given tests of their knowledge and skills in an area such as instructional use of computers. This suggests that instead one should use observational techniques. These should include unobtrusive observation (walk-bys of teacher classrooms, noting who is using school computer facilities, sign out sheets for mobile computers, department requests for software and hardware) and obtrusive observation (classroom visitations). An excellent reference on unobtrusive evaluation techniques is Webb et al (1966).

Currently there is little theoretical basis for the development of effective computer related inservice. Without the development of this knowledge, staff developers will continue to reinvent the wheel every time they need to conduct computer related inservice. Documenting, through evaluation, the successes and failures can help us build a common knowledge base useful to both researchers and practitioners.

Magnitude and extent of the evaluation

The appropriate magnitude and extend of an evaluation is dependent on the magnitude of your staff development goals for integrating computers into the classroom. Small and simple goals requires smaller evaluations, while complex goals require substantial evaluation efforts. As a very rough rule of thumb, you might think of spending approximately ten percent of the inservice time, effort, and money on evaluation.

Longitudinal evaluation is a systematic way to detect permanent changes in participant behavior, the types of changes, and if the changes were the anticipated ones. Measuring changes in participant behavior enables you to assess the level of implementation that has occurred following inservice. Determining the level of implementation is important because with complex changes (such as increasing in-class computer use) staff developers frequently under estimated the time required to bring about a permanent change. Remember, evaluation of the impact on students can not be determined unless some predetermined level of in-class computer use has been achieved.

To date, most evaluation efforts have been small scale and short term. These evaluations concentrate on measuring the appropriateness of inservice content and materials, the effectiveness of the delivery system, and immediate changes in participant attitude, knowledge, or skill level occurred. This information is especially important when developing new inservice programs. However, without knowledge of the long-term residual effects, it is difficult to determine what changes occurred and if they were maintained. This prevents staff developers from systematically planning what should be done next or what additional interventions are necessary before moving on.

Collecting evaluation data

One overriding concern of any evaluation plan is to *not* overwhelm the subjects with additional work. This is especially true when working with classroom teachers. Frequently, teachers attend inservice programs following a full day of classes and are tired. However, teachers respond positively when they feel the information provided by them is valued and will be used by the project developers.

A substantial amount of data can be gathered quite quickly if the data collection instruments are carefully designed. "Keep it short and simple (KISS)" is a reasonable motto. The evaluator should think carefully about the purpose of each question. How will the data be analyzed, and how will it be used?

It is also important to be aware of the attitude of the subjects you are working with. A volunteer group in general will be more respective than a coerced group. Evaluation of the the CI^3 project suggests that a volunteer group selected to participate via a competitive process will be the most likely to participate in a longitudinal evaluation. (That is, the ideal situation is that the participants are volunteers, and more people volunteer than can be accommodated.)

It is highly recommended that all evaluation information be anonymous. (By this we mean that the facilitator of the inservice should not be able to connect formative and summative evaluation data collected during and after the inservice with specific individuals in the inservice.) It is a fact of life that any evaluation is stressful to people participating in it. Making all data anonymous does two things. One, it helps assure subjects their responses will not result in negative or punitive actions. Two, it creates an atmosphere where teachers are comfortable responding in an honest and frank manner to evaluation questions.

The problem of evaluation stress is compounded when computers are involved. Computer-related inservice can produces high levels of stress because of the difficulty associated with integrating computers into the classroom. The combination of the normal evaluation stress and stress related to computers has the potential for creating an extremely bad situation. Reducing both sources of stress is extremely important if you want to be successful in this major change effort.

An example

In this section we will describe the development of an instrument for evaluating a computer inservice. We include the instrument that was developed and a sample of the outcomes obtained when the instrument was used with a group of secondary school science teachers who were participating in a series of inservice sessions. We will cover purposes, instrument design, file construction, statistical analysis, and interpretation. The ideas illustrated here are equally applicable in inservices in math, science, social studies, elementary education, etc.

The purpose of our evaluations in the CI^3 project was three fold: 1) formative 2) summative and 3) long-term residual. Here we will concentrate on the formative and summative aspects of one workshop devoted to integrating computers into the middle and secondary school science curriculum. The same ideas can be applied to inservices aimed at other groups of educators.

Concern for the participant: Participants do not come to us to be evaluated, they come to learn. One must keep the forms and the evaluation brief. We allow about 40 minutes for the whole process during the eight two-hour inservice sessions, with 20 minutes devoted to mid-course session and 20 minutes devoted to evaluation during the final session. The inservice providers were not in the room during the collection of data; the outside evaluator distributed, collected and analyzed the data.

Form Development: Many of the forms we are using to illustrate the process (a number of additional forms are given in the next chapter) were developed following observations of the sessions. The local evaluator attended the majority of the inservice sessions and had a good idea of what the content was for each session. The specifications driving the writing of the forms were to what the content was for each session. The specifications driving the writing of the forms were to assess 1) quality of the delivery of the information 2) interest of the material to the participant, and 3) relevance of the materials to the teaching tasks of the participants.

An evaluation instrument was developed to specifically fit the software used in the sessions. The science inservice sessions used Macintosh computers and the primary piece of software was MicroSoft Works, an integrated package. Most of the inservice participants did not have access to Macintosh computers in their schools. (This means that modifications of the instrument will be needed to fit other inservices that use different hardware and software, and focus on different subject matter.)

All evaluation instruments should end with a series of open-ended questions. However, it is prudent to restrict the space allowed for writing open-ended responses.

The usual method of form development involves a stage in which there is a pilot test of the form itself. In informal and semi-formal situations, this can be accomplished with a small number of people. The main idea is to be sure that the wording is clear.

Questionnaire specifications: The instrument given in Figure 2 was used to evaluate a computer workshop designed for a mixed audience of absolutely novice and more experienced users of computers. All were middle-school and high-school science teachers. The main long-term goal of the workshop was to increase the use of computer as a tool in the science classes taught by the participants.

The goals of the questionnaire were to evaluate the technical quality of the delivery, the specific action of some of the components, and whether the participants were able to see the major goal of the workshop. There were a few questions aimed at specific problems such as the effect of computer labs on instruction and the problems that participants may have had shifting to an unfamiliar computer. (While a number of participants had encountered the Macintosh before, relatively few had substantial experience with this machine.)

Questions 1, 7, 14, 15, 16, 18, 20, 22, and 25 are directed to the delivery of the workshop. Question 25—I would recommend this workshop session for other teachers—is particularly important. If the responses to this question were negative, then there would have been the need for extensive soul searching and a change in direction.

Questions 4, 8, 10, 11, and to some extent 9, are directed to the type of programs being presented in the first half of the workshop. In these sessions the general presentations covered using the computer and databases. This was what was being taught, it was not negotiable. Negative responses to these questions would have led to a rethinking of the delivery system, not a reemphasis on other materials.

Question 2 and 4, are directed at the general idea of the workshop. These questions were covered more thoroughly in the evaluation at the end of the workshop.

Question 23, 24, 27, and 29, were directed to some problems revolving around transferring from Apple to Macintosh computers. Question 26 was very specific because the evaluator noticed that some of the participants seemed to be having difficulty with the mechanics of typing.

In summary: We expect to ask questions focused at the content of the workshop. We expect to take a very brief look at the effectiveness of the delivery systems, which include the quality of the teaching and the programs demonstrated.

Results: Figure 2 presents the evaluation instrument and sample data collected about halfway through the inservice. The relevant information to examine is the mean responses to each of the Items 1-25. It is well not to overwhelm the user of the data with statistical excesses from packaged programs. The inservice facilitator may be able to modify the inservice sessions in response to major deviations from what was anticipated. Means, rounded to the nearest .5, suffice for this purpose. Of course, some inservice facilitators will want to see more detailed statistics. We have not included additional statistical data here, but the evaluator of the project provided as much detail as the facilitators desired.

Output in the form of Figure 2 contains information that is very helpful. In particular, question 3 reveals that participants see the ability to use computers more in the future as being enhanced. It is quite apparent that the overall evaluation of this workshop is good. The participants feel more confident with computers (Q1), find the material worthwhile (Q14), and see the workshop as relevant. Some of the texture of the situational setting can be found in the participants responses to the questions about availability of computers (Q21 and Q13). Those delivering the workshop should be proud of the responses to Q14, the binder and handout materials are useful; Q16, the workshop lived up to my expectations; and Q25, I would recommend this workshop to others. Responses to all these questions are near the top of the scale.

There are worries; Q2 indicates that they are not using the computer more. Q9 and Q11 indicate that more time should be spent on why databases are needed and the game of the week.

It is important to remember why this particular workshop was selected for illustration. It was the first time the science inservice was offered to a group of teachers, and it was the first time the inservice facilitator was in charge of such an extensive inservice series of sessions. Different computers were used (that is, Macintosh computers instead of the Apple 2 computers that the participants might have anticipated). The second presentation of the material (that is, a replication of the inservice series done the next year) showed that the providers made some changes that were reflected in the participants responses. The evaluator does not recommend cross-group comparisons because conditions and clients are not constant.

Science Inservice Evaluation Instrument (This is the start of Table 2)

(*Note*: This instrument was designed to require about 20 minutes to complete. The small letter "m" in the response field indicates the Mean Response of a group of science teachers who were participating in a sequence of eight two-hour computer inservices.)

Instructions: Please take about 20 minutes of your time to fill out the form. It is designed to help us assess the quality and effectiveness of the inservice, and to improve it. All responses will be confidential. Only summary statistical data and responses that cannot be used to identify specific participants will be provided to the inservice facilitator.

In the following questions, a response of 1 indicates that you strongly disagree with the statement, while a response of 5 indicates that you strongly agree with the statement. A response of 3 is neutral.

		Disagree				Agree
1.	I feel more competent with computers than I did at the start of this workshop.	1	2	3	4 m	5
2.	I am using computers more with my students than I did at the start of the workshop.	1	2 m	3	4	5
3.	As a result of this workshop, in the future I will be able to use computers more with my students.	1	2	3	4 m	5
4.	I can see ways to integrate the programs demonstrated in the workshop into my curriculum.	1	2	3	4 m	5
5.	As a result of this workshop, I have found programs not demonstrated in the workshop and integrated them into my curriculum.	1	2 m	3	4	5
6.	I have been able to interest other teachers in what we have been doing in these workshops.	1	2	3 m	4	5
7.	The sessions contain too much information to absorb comfortably.	1	2 m	3	4	5
8.	I would like to see some programs demonstrated that are	1	2	3	4	5

9.	The Game of the Week has been helpful.	1	2 m	3	4	5
10.	The sessions have helped me recognize non-computerized database applications in my classroom.	1	2	3	4 m	5
11.	I feel that databases have a legitimate role in science classrooms.	1	2 m	3	4	5
12.	Time should be spent exploring practical problems like getting students to the computers.	1	2	3 m	4	5
13.	The greatest block to using computers is lack of access.	1	2	3 m	4	5
14.	The contents of the binder (the handouts) is worthwhile.	1	2	3	4 m	5
15.	The workshop activities are relevant to my current classroom needs.	1	2	3	4 m	5
16.	This workshop has lived up to my expectations.	1	2	3	4 m	5
17.	I have learned a great deal about computers from other participants in the inservice.	1	2	3 m	4	5
18.	We should take more time to explore the programs that we have seen in the workshops.	1	2 m	3	4	5
19.	The instructors should have spent more time assessing existing computers skills in the group of participants.	1	2 m	3	4	5
20.	The written materials clearly explain the software that we are using during the workshop sessions.	1	2	3	4	5 m
21.	The district emphasis on computer laboratories for word processing limits access to computers at those times I might use them for science.	1	2	3	4 m	5
22.	The progress of the workshop through the computer programs we have explored is slower than I would have liked.	1	2 m	3	4	5
23.	Transfer (of my previous computer knowledge) from other computers to the Macintosh was relatively easy for me.	1	2	3 m	4	5
24.	Learning the mechanics of using the computer is more the responsibility of the individual teacher (via working outside of the workshop) than it is of the workshop facilitators during workshop sessions.	1	2	3	4 m	5
25.	I would recommend this workshop for others.	1	2	3	4 m	5

Instructions: The following four questions can be answered Yes or No. Please circle your choice.

(*Note to reader*: The percentages given are data from the same group as above.)

26. I am a reasonably competent touch typist. Yes 67% No 33%

27. I was familiar with the Macintosh computer before the start of the workshop. Yes 42% No 58%

28. The bulk of the material we have covered was familiar to me before the start of the workshop. Yes 25% No 75%

29. I was familiar with the Apple *II* computer or other computers before the start of the workshops. Yes 67% No 33%

Instructions: Please provide brief responses to the following questions. Use the back of the page if necessary.

30. What is the most positive aspect of the workshop?

31. What are the factors most needing improving?

32. Please write up three ideas that you think you have picked up that may be directly applicable to your classes.

33. Any other comments you would like to make would be appreciated.

Table 2: Science Inservice Evaluation Instrument

References

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5.2
EVALUATION FORMS

This section contains samples of a number of the evaluation forms used during the NSF project inservices.

Title of Form	Page
Principal Interview Form (Needs Assessment)	2
School Site Information Sheet	4
CI^3 Teacher Needs Assessment	5
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Computer Attitudes Survey	11
Sample Results from Computer Attitudes Survey	12
Ease of Use Survey	13
Participant Log Sheet	14
Social Studies Inservice Evaluation	15

Principal Interview Form (Needs Assessment)

Name: ____________________________________

School: __________________________________

Date: ____________________________________

Principal interviews are conducted as part of the needs assessment. The idea is to interview the principals (or other high level school administrators) in the schools of the inservice participants. Ideally, the people being interviewed would also participate in all of the inservice sessions, or at least in a significant number of them. Research suggests that this is highly desirable if the intent is that the inservices will lead to changes in the classroom. School administrators are key educational change agents. Unless they give open and strong support to teachers working to make change in the curriculum, relatively little change is apt to occur.

One typically begins an interview by explaining its purpose and what the information will be used for. The person being interviewed should be assured that the information will be confidential. Some people doing interviewing find it desirable to use a tape recorder. If this is done, be sure to ask the interviewee if he/she minds being recorded. Since direct quotes of the answers are not needed and many people feel uncomfortable talking into a recorder, it is probably better to not make use of a recorder.

When several people are to be interviewed for the same purpose, it is helpful to have a script or a sequence of questions that all will be asked. However, feel free to deviate from the script in order to follow up on important issues.

1. What do you perceive are the most pressing needs related to the use of computers in your school? (*Note*: Presumably the interviewee knows that your orientation is toward instructional uses of computers. However, you might find that the answer provided is oriented toward administrative uses. If so, you might want to try this question again, but emphasizing instructional uses.)

2. Please describe the role and duties of the computer coordinator or computer building representative at your school. (If there is no such person, probe to find the name of the person who tends to do the most in helping the school make instructional use of computers.)

3. Please describe some of the instructional uses of computers currently occurring at your school.

4. What computer equipment is available for use by students and teachers at your school? Where and/or how is it situated?

5. What training has your staff had in the use of computers?

6. What training have you had? (Describe how you use computers to do your job.)

7. Does your school have a written set of long-range plans for instructional use of computers? (If yes, can you provide me with a copy? What are some of its key goals?)

8. Does your school district have a written set of long-range plans for instructional use of computers? (If yes, can you briefly describe the plans?)

9. Are there other important things I should know about instructional use of computers in your school that would be helpful in designing and conducting inservice for your teachers?

School Site Information Sheet

(*Note*: It is often quite desirable to hold inservice sessions in the schools of the participants. This form is designed to aid in collection of information about the computer facilities available in a school that might be available for inservice sessions and/or that might be available to inservice participants for their personal use and use with students.)

Site ______________________ Contact Person ________________________

Which equipment is available? ______________________________________

____

When is equipment available? ______________________________________

____

Where is equipment available? ______________________________________

____

What is the procedure for organizing or obtaining equipment for use in the classroom?

____

____

What is the procedure for securing the lab? ______________________________

____

What software is available? ______________________________________

____

____

How is it obtained? ____

____

Time schedule? (Obtain a copy of the school and its teachers' time schedule.)

CI^3 Teacher Needs Assessment

Name: ______________________________

School: __________________________

(This instrument is designed to be filled out by teachers who might be interested in participating in a computer inservice. One way to make use of this instrument is to meet with the teachers in a school who have expressed some interest in an inservice. Discuss the nature of the types of inservices that might be possible. Answer their questions. Then have each person who might be interested in participating in an inservice fill out the following form. Assure the teachers that the results will be confidential.)

Instructions:
For numbers **1-5** below, please **circle** yes or no.

1. Have you requested that your school or department purchase any software within the last year? **YES** **NO**

2. Have you used the school district's software preview center within the past 12 months? **YES** **NO**

3. Does the integration of the computer in education change the priorities of what should be taught in the curriculum? **YES** **NO**

4. Do you plan to purchase a personal computer within the next 12 months? **YES** **NO**

5. Do you have a computer in your home? **YES** **NO**
   If you circled **YES**,

   (a) What brand and model is it?

   (b) How much is it used, and for what purposes?

   (c) Do you bring it into the classroom? YES NO

Instructions:
For numbers **6-14** below, please write a **brief** answer.

6. List the **subject areas** in your curriculum where you think computer use is currently helping **your students**.

7. List the general types of **computer applications** you think are currently helpings **your students**.

8. List the **subject areas** in your curriculum where you think computer use is currently helping **you**.

9. List the general types of **computer applications** you think are currently helping **you**.

10. List the areas (not necessarily in your classroom) where you might like to use a computer if you could gain appropriate training and access to facilities (ie., any kind of personal use, recreation, database, gradebook, etc.).

11. List the **names** of the computer programs/packages (titles) you have ordered or requested to be ordered for educational/school use in the last year.

12. List the **names** of the top five computer programs/packages (titles) that you use or have used most frequently with your students.

13. (a) List the **names** of the top five computer programs/packages (titles) that you use in your role as an educator or for personal use.

(b) Indicate the **approximate number** of computer programs/packages you use with your classes. ________

(c) Indicate the **approximate number** of computer programs/packages that you use for personal use. ________

14. What kind of inservice or workshops would you like to see in the future? What characteristics and content would they have to have so that you would probably participate on a voluntary basis?

Concerns Questionnaire

Name ______________________________

Date ______________

The purpose of this questionnaire is to determine the concerns people have about future educational innovations. The items were developed from typical responses of school and college educators who ranged from having no knowledge at all about various innovations to many years experience in using them. Therefore, *a number of the items may appear to be of little relevance to you at this time*. For the completely irrelevant items, please circle "0" on the scale. Other items will represent those concerns you *do* have, in varying degrees of intensity, and should be marked higher on the scale, according to the explanation at the top of each of the following pages.

For example:

0	1	2	3	4	5	6	7
	Not true of me now		Somewhat true of me now			Very true of me now	

0 1 2 3 4 5 6 7	This statement is very true of me at this time. (Circle the 7. A slightly less strong response would be given by circling the 6.)
0 1 2 3 4 5 6 7	This statement is somewhat true of me now. (Circle the 4. A slightly weaker response would be given by circling the 3 while a slightly stronger response would be given by circling the 5.)
0 1 2 3 4 5 6 7	This statement is not at all true of me at this time. (Circle the 1. A slightly stronger response would be given by circling the 2.)
0 1 2 3 4 5 6 7	This statement seems irrelevant to me. (Circle the 0.)

Please respond to the items in terms of *your present concerns*, or how you feel about your involvement or potential involvement with *integration of computers into instruction*. We do not hold to any one definition of this innovation, so please think of it in terms of *your own perception* of what it involves. Because this questionnaire is used for a variety of innovations, the term *computer integration* never appears. However, phrases such as "the innovation," "This approach," and "the new system" all refer to *computer integration*. Remember to respond to each item in terms of your *present concerns* about your involvement or potential involvement with *computer integration*.

Thank you for taking time to complete this task.

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0 1 2 3 4 5 6 7
Not true of me now — Somewhat true of me now — Very true of me now

0 1 2 3 4 5 6 7	I am concerned about evaluating my impact on students.
0 1 2 3 4 5 6 7	I would like to revise the innovation's instructional approach.
0 1 2 3 4 5 6 7	I am completely occupied with other things.
0 1 2 3 4 5 6 7	I would like to modify our use of the innovation based on the experiences of our students.
0 1 2 3 4 5 6 7	Although I don't know about this innovation, I am concerned about things in the area.
0 1 2 3 4 5 6 7	I would like to excite my students about their part in this approach.
0 1 2 3 4 5 6 7	I am concerned about time spent working with nonacademic problems related to this innovation.
0 1 2 3 4 5 6 7	I would like to know what the use of the innovation will require in the immediate future.
0 1 2 3 4 5 6 7	I would like to coordinate my effort with others to maximize the innovation's effects.
0 1 2 3 4 5 6 7	I would like to have more information on time and energy commitments required by this innovation.
0 1 2 3 4 5 6 7	I would like to know what other faculty are doing in this area.
0 1 2 3 4 5 6 7	At this time, I am not interested in learning about this innovation.
0 1 2 3 4 5 6 7	I would like to determine how to supplement, enhance or replace the innovation.
0 1 2 3 4 5 6 7	I would like to use feedback from students to change the program.
0 1 2 3 4 5 6 7	I would like to know how my role will change when I am using the innovation.
0 1 2 3 4 5 6 7	Coordination of tasks and people is taking too much of my time.
0 1 2 3 4 5 6 7	I would like to know how this innovation is better than what we have now.

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0	1	2	3	4	5	6	7
Not true of me now			Somewhat true of me now			Very true of me now	

0 1 2 3 4 5 6 7	I am concerned about students' attitudes toward this innovation.
0 1 2 3 4 5 6 7	I now know of some other approaches that might work better.
0 1 2 3 4 5 6 7	I don't even know what the innovation is.
0 1 2 3 4 5 6 7	I am concerned about about not having enough time to organize myself each day.
0 1 2 3 4 5 6 7	I would like to help other faculty in their use of the innovation.
0 1 2 3 4 5 6 7	I have a very limited knowledge about the innovation.
0 1 2 3 4 5 6 7	I would like to know the effects of reorganization on my professional status.
0 1 2 3 4 5 6 7	I am concerned about conflict between my interests and my responsibilities.
0 1 2 3 4 5 6 7	I am concerned about revising my use of the innovation.
0 1 2 3 4 5 6 7	I would like to develop working relationships with both our faculty and outside faculty using this innovation.
0 1 2 3 4 5 6 7	I am concerned about how the innovation affects students.
0 1 2 3 4 5 6 7	I am not concerned about this innovation.
0 1 2 3 4 5 6 7	I would like to know who will make the decisions in the new system.
0 1 2 3 4 5 6 7	I would like to discuss the possibility of using the innovation.
0 1 2 3 4 5 6 7	I would like to know what resources are available if we decide to adopt this innovation.
0 1 2 3 4 5 6 7	I am concerned about my inability to manage all the innovation requirements.
0 1 2 3 4 5 6 7	I would like to know how my teaching or administration is supposed to change.
0 1 2 3 4 5 6 7	I would like to familiarize other departments or persons with the progress of this new approach.

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Demographic Self-Description

PLEASE COMPLETE THE FOLLOWING:

1. What percent of your job is:

   Teaching ____% Administration ____% Other (specify)____________%

2. Do you work: full time _____ part time _____

3. Female _____ Male _____

4. Age: 20-29 ____ 30-39 ____ 40-49 ____ 50-59 ____ 60-69 ____

5. Highest degree earned:

   Associate _____ Bachelor _____ Masters _____ Doctorate _____

6. Year degree earned: _____ 7. Total years teaching _____

8. Number of years at present school: _____

9. In how may schools have you held full-time appointments?

   one____ two ____ three ____ four ____ five or more ____

10. How long have you been involved in computer integration, not counting this year?

    never ___ 1 year ___ 2 years ___ 3 years ___ 4 years ___ 5 years or more ___

11. In your use of computer integration, do you consider yourself to be a:

    nonuser ___ novice ___ intermediate ___ old hand ___ past user ___

12. Have you received formal training in computer integration (workshops, courses)?

    yes _____ no _____

13. Are you currently in the first or second year of use of some major innovation or program other than computer integration?

    yes _____ no _____

    If yes, please describe this program briefly.

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Computer Attitudes Survey

Name: ____________________________

School: ____________________________

(*Note*: It is relatively common to administer an attitude scale before and after an inservice, and perhaps a third time for long term follow-up. This is done as part of the summative evaluation of an inservice. As for all collections of evaluative information, participants should be reassured that the information collected will be confidential and will not affect their grade in the inservice. Ideally, this survey form would be administered, collected, and analyzed by someone other than the inservice facilitator.)

Instructions:
Please circle the number that best describes your attitude. If you strongly agree with the statement circle 1 for strongly agree. If you strongly disagree with the statement circle 5. Circle 3 if your attitude toward the statement is neutral.

		Strongly Agree				Strongly Disagree
1.	Computers can improve learning of higher order skills.	1	2	3	4	5
2.	Computers will improve education.	1	2	3	4	5
3.	Computers can improve drill and practice.	1	2	3	4	5
4.	Computers will create jobs needing specialized training.	1	2	3	4	5
5.	Computers will improve health care.	1	2	3	4	5
6.	A person today cannot escape the influence of computers.	1	2	3	4	5
7.	Computers will displace teachers.	1	2	3	4	5
8.	Computers will dehumanize society.	1	2	3	4	5
9.	Computers can teach better than teachers.	1	2	3	4	5
10.	Computers are beyond the understanding of the typical person.	1	2	3	4	5
11.	Computers will replace low-skill jobs.	1	2	3	4	5

From *Computer Attitudes Factor Structure in Cognitive and affective computer attitude scales: A validity study.* by S.H. Bannon, J.C. Marshall, and S. Fluegal, 1985, *Educational and Psychological Measurement*, 679-681.

Sample Results from Computer Attitudes Survey

The Computer Attitudes Survey was administered to 28 participants at the beginning and end of an eight-session inservice designed to teach tool use of computers in the curriculum. The table below gives the means of their responses. The last column gives the results of a 2-tail t-test, and indicates a significant change only on the first item.

Item Number	Beginning Mean	Ending Mean	2-tail t-test p =
1.	1.786	1.250	.026
2.	1.857	1.929	.731
3.	1.571	1.714	.355
4.	1.407	1.500	.490
5.	2.036	1.857	.408
6.	1.357	1.429	.691
7.	4.571	4.750	.259
8.	4.179	4.250	.646
9.	4.500	4.643	.460
10.	4.357	4.714	.096
11.	3.321	3.500	.456

Ease of Use Attitude Survey

Name: ____________________

School: ____________________

(*Note*: This attitude survey form could be administered concurrently with the Computer Attitudes Survey. For many teachers, their attitude toward ease of availability and access of computer software and hardware may be a major determining factor in whether they make instructional use of computers for themselves and their students.)

Instructions:
The following activities relate to the ease of using computers and software in your curriculum and classroom. For numbers 1-7, please circle the number that **best** describes your attitude towards each activity. The scale runs from 1 (Very Difficult) to 5 (Very Easy).

	Very Easy				Very Difficult
1. Obtaining a computer and monitor for use in my class is	1	2	3	4	5
2. Obtaining the proper software is	1	2	3	4	5
3. Scheduling the use of the computer lab for my class is	1	2	3	4	5
4. Obtaining time for setting up the computer in my class is	1	2	3	4	5
5. Obtaining time for learning how to use and review new software is	1	2	3	4	5
6. Obtaining time for using the computer within the present curriculum is	1	2	3	4	5
7. Using a computer and software in my class is	1	2	3	4	5

8. The number of machines available for use in my classroom is __________.

9. The number of teachers who share the available machines is __________.

Participant Log Sheet

(*Note*: Participants were requested to keep a daily log of their computer use and related activities during the weeks of the inservice sessions. These were turned in each week and provided the inservice facilitator with valuable, formative evaluation information.)

Name ______________________________ Date ____________

Please use this form to record **all** of your computer-related activities, both at school and at home, during the week. This log sheet is not used for grading purposes. Its purpose is to provide formative evaluation information to the inservice facilitator.

Monday

Tuesday

Wednesday

Thursday

Friday

Weekend

Use back of sheet for notes, additional comments, and questions you would like to ask the inservice facilitator.

Social Studies Inservice Evaluation Form

(*Note*: A formative evaluation form of this sort can be used in almost any inservice directed toward helping participants learn to make increased and appropriate instructional use of computers in their classrooms. The sample form provided here was designed for use in an inservice for secondary-school social studies teachers. With slight modification it can be used in a math, science, elementary school, etc. inservice. Participants should be assured that their answers will be kept confidential and will have no bearing on their grade in the inservice, if grades or other requirements have been established for satisfactory completion of the inservice. It is desirable that this form be administered and compiled by someone other than the inservice facilitator. The inservice facilitator should only receive summary statistical data and participant comments that cannot be associated with specific participants. Note also that the same form could be used several times during an inservice that extended over a number of sessions.)

Name: ______________________________

School: ______________________________

We are interested in your overall evaluation of this workshop. For numbers 1 - 34, please circle the number that best describes your attitude. If you agree with the statement, circle 5 for agree. If you disagree with the statement, circle 1. Circle 3 if your attitude toward the statement is neutral.

		Disagree				Agree
1.	I feel more competent with computers than I did at the start of this workshop.	1	2	3	4	5
2.	My students have increased their classroom use of computers as a result of this workshop.	1	2	3	4	5
3.	Lack of student access to computers is the greatest block to my integrating computers into the curriculum.	1	2	3	4	5
4.	I feel competent integrating the software programs and activities demonstrated in the workshop into my teaching.	1	2	3	4	5
5.	I have sought out and located software programs not demonstrated in the workshop and integrated them into my curriculum.	1	2	3	4	5
6.	I have been able to interest other teachers in what we have been doing in these workshops.	1	2	3	4	5
7.	Too much information was presented during the sessions to absorb comfortably.	1	2	3	4	5
8.	I would like to see the workshop demonstrate software programs and activities more directly related to my content area.	1	2	3	4	5

		Disagree				Agree
9.	Time should be spent exploring practical problems like getting students to the computers.	1	2	3	4	5
10.	As a result of this workshop I will increase my instructional use of computers with my students.	1	2	3	4	5
11.	The contents of the participant notebook and handouts will be useful in planning and developing computer related activities for my classes.	1	2	3	4	5
12.	I have started collecting computer software disks.	1	2	3	4	5
13.	This workshop has lived up to my expectations.	1	2	3	4	5
14.	I have learned a great deal about computers from other participants in the workshop.	1	2	3	4	5
15.	More time should have been set aside for participants to explore the software programs and materials demonstrated during the workshop.	1	2	3	4	5
16.	The written materials clearly explain how to move through the programs.	1	2	3	4	5
17.	The progress of the workshop is slower than I would have liked.	1	2	3	4	5
18.	The information presented in the sessions is relevant to my classroom.	1	2	3	4	5
19.	I would recommend this workshop to other teachers.	1	2	3	4	5
20.	I am not convinced that computers will increase student achievement in my content area.	1	2	3	4	5
21.	I now talk more to other teachers about computers than I did at the start of the workshop.	1	2	3	4	5
22.	Money for computers should be shifted from other areas of the school budget.	1	2	3	4	5
23.	The instructors should have spent more time demonstrating a greater variety of software.	1	2	3	4	5
24.	The greatest block to my using computers in the classroom is my philosophical disagreement with their worth in my content area.	1	2	3	4	5
25.	The progress of the workshop is faster than I would have liked.	1	2	3	4	5

		Disagree				Agree
26.	Lack of teacher access to computers is the greatest block to my using computers.	1	2	3	4	5
27.	I would like a workshop leader to come into my classroom and demonstrate a lesson using the computer as an instructional tool.	1	2	3	4	5
28.	I feel more comfortable using computers with my students than I did at the start of the workshop.	1	2	3	4	5
29.	I am willing to have someone come into my classroom and observe me using computers with my students.	1	2	3	4	5
30.	I am more inclined to let students use computers to develop an understanding of concepts and ideas than I was at the start of the workshop.	1	2	3	4	5
31.	I would have liked time during the workshop to modify and/or develop computer activities for use in my classroom.	1	2	3	4	5
32.	I would prefer that all workshop participants be teaching the same courses and grade levels.	1	2	3	4	5
33.	I found it easy to get access to computer hardware and software between sessions to try out ideas we learned in the workshop.	1	2	3	4	5
34.	I would be more likely to use computers if there was a computer resource person I could consult with at my school.	1	2	3	4	5

For questions 35 - 40, please circle yes if you agree with the statement and no if you disagree with the statement.

35.	I have spent more time watching others use the computers in the workshop than I have spent in using them myself.	Yes	No
36.	The goal of this workshop should be developing teacher skills in the practical use of the computer.	Yes	No
37.	I felt pressure to attend this workshop from other sources.	Yes	No
38.	I would rather spend more time with the computers and less time concerning ourselves with issues such as other resources in the school.	Yes	No

39. The goal of this workshop should be developing an understanding of how to integrate computers into my content area. Yes No

40. I have increased my understanding of how to use computers as a problem solving tool as a result of this workshop. Yes No

For numbers 41 - 48, please circle the number the best describes your attitude toward each of the software programs listed. If you think the program was excellent, circle 5 for excellent. If you think the program was poor, circle 1. Circle 3 if your attitude toward the program is neutral. Please do not refer to your handouts or notebook; we are interested in how you remember these software programs.

	Poor				Excellent
41. United States Database	1	2	3	4	5
42. North American Database	1	2	3	4	5
43. President Elect	1	2	3	4	5
44. The Other Side	1	2	3	4	5
45. U.S. History	1	2	3	4	5
46. Easy Graph	1	2	3	4	5
47. MECC Graph	1	2	3	4	5
48. Bank Street File	1	2	3	4	5

Please write brief answers to the following questions.

1. Has the workshop been relevant to your needs?

2. Has the workshop been organized in a way that facilitated learning? If not, how can we improve it?

3. Please write a short description (two or three sentences) of what you perceive as the purpose of the workshop.

4. Identify the most positive aspect(s) of the workshop.

5. Please describe two or three ideas demonstrated during the workshop that are directly applicable to your classes.

6. What can we do to improve this workshop and others like it?

7. Please feel free to make any general comments about the inservice.

5.3
LONG TERM FOLLOWUP EVALUATION

As indicated in Section 5.1, relatively few inservice projects conduct meaningful long-term followup evaluation to determine possible effects of the inservice. The NSF project conducted quite a bit of long-term followup evaluation. Most of this research was conducted by two graduate students who were employed by the project and conducted the evaluations as part of their Ph.D. dissertation research. The references to their Ph.D. dissertations are given below. Each of these dissertations is available for $20 from the International Society for Technolgoy in Education, 1787 Agate Street, Eugene, Oregon 97403-9905.

Hanfling, S. S. (1986). *A formative evaluation of elementary and secondary staff development inservices on integrating computer innovations into the curriculum*. Doctoral Dissertation, University of Oregon.

Johnson, V. P. (1988). *An exploratory case study describing the long-term residual effect of the computer-integrated instruction inservice (CI^3 project)*. Doctoral Dissertation, University of Oregon.

The following pages contain some of the instrumentation that was used in the long-term evaluation. Much more detail is provided in the Ph.D. dissertations. Readers interested in the details of such long term evaluation are well advised to begin by reading Vivian Johnson's dissertation.

Title	Page
CI^3 Inservice Participant Focused Interview (Long Form)	2
CI^3 Inservice Participant Focused Interview (Short Form)	7
CI^3 Project Long-Term Assessment	9

CI^3 Inservice Participant Focused Interview
(Long Form)

Site: ____________________ Date: ____________________

Subject: ____________________ Researcher: ______________

Introduction

Purpose	This interview is part of the CI^3 inservice follow-up. The interview is a major source of data to help us determine the residual effect of the inservice you completed.
Topics to be covered	Interview questions will briefly cover the following topics: your teaching experience, your experience with computers, features of the inservice, your attitude and expectations about using computers in education, and how completing the inservice affected you. If there is time available at the end of the interview, please feel free to go back and provide more detail on specific questions.
Ethics	I would like to tape record this interview only for the purpose of validating the accuracy of my questions. The taped interview will be heard by only myself and (list and other names and explain why they may also listen to the recording). Your name will never be mentioned, nor will any particular response be connected to you. In addition, you may turn the tape recorded off at any time.
Concerns of respondent	Do you have any questions or concerns before I begin?

Experience (Time allocation five minutes)

Teaching How long have you been teaching (brief)?

Computers Briefly describe your experience with computers.

If experienced, what brands of computers do you feel ***comfortable*** using?

___ Apple
___ Atari
___ Commodore (PET)
___ Macintosh
___ IBM
___ Radio Shack
___ Commodore C-64
___ Other (Note Brand)

Inservice Features (Time Allocation five-seven minutes)

Content What did you perceive as the ***subject*** of the inservice you completed?

Positive features What were the ***features*** that made the inservice work best for you? Examples?

(As a backup, show list of inservice features and ask: Do you remember any of these features?)

Limitations What ***features*** of the inservice ***limited*** its success?

(As a backup, show list of features and ask: Others say these features are the most important, what would you add or delete? Did your inservice have these?)

Changes over time

Would your answers have been different just after you finished the inservice?

Attitudes and Expectations

(Time allocation ten minutes)

Computers in education

What do you think we should be doing with computers in education?

Probe to elicit teachers' perceptions of the appropriate use of computers for enrichment, remediation, and regular instruction.

If time permits suggest teachers describe some specific examples of appropriate uses.

Teaching	What would you like to be doing with computers in your own classroom?
Effect on students	What effect will classroom use of computers have on your students? How will they respond? What will they learn?
Reason for inservice	Why did you sign up for the inservice? Was it voluntary? __ yes __ no
Anticipated Outcomes	What did you hope to learn? What did you hope to be able to do?
Outcomes	(Time allocation 15 minutes)
Expectations	Did you learn what you hoped to learn? Why? Why not?
Knowledge and Skills	Describe what you learned? What facts and skills?
Teaching	Did the inservice affect the way you teach? Either how you teach or what you teach?
Students	Name the computer applications that you feel are the most beneficial to your students? (Provide only word processing as an example of a computer application.)

	Have you seen changes in your students since using computers in the class? (Possible examples: student's attitude toward school, toward learning, toward subject matter.)
Plans	What do you plan to be doing with computers in the future?
Problems	What factors influence your choice to use or not use computers in your classroom? (If participants have difficulty answering this questions—suggest they think about the following: access to computers, time issues, support from school administration, etc.
	What problems have you had trying to use computers that the inservice did not prepare you to solve?
Changes in inservice	How would you change the inservice? (Omit if time becomes a problem)
Final Instructions	We are at the end of the interview, is there anything else you would like to mention or a question you wish to go back to? **Please thank the individual for their time and input and tell them they have been very helpful.**

CI^3 Inservice Participant Focused Interview
(Short Form)

Name: ______________________________

School: ______________________________

Date: ______________________________

Instructions:

Instruct the participant to answer the following questions as briefly as possible. (*Note*: Use the same confidentiality discussion as is given with the Long Form.)

1. Describe the purpose of the CI^3 computer workshop.

2. State why you participated in the CI^3 computer workshop.

3. List three changes, in you as an individual or teacher, that can be **attributed** to your participation in the CI^3 sessions.

   a)

   b)

   c)

4. Identify the three most important experiences that occurred during the training.

   a)

   b)

   c)

5. List the **subject areas**, identified in the training, where computer use benefits **your students**.

6. List the **computer applications,** identified in training, that benefit **your students**.

7. List the **subject areas,** discussed in training, where you think computer use **benefits you**

8. List the **computer applications,** utilized in training, that **benefit you**.

9. Do you feel you know enough about computers to make **effective** use of them in **your** teaching?

10. How has the **non-computer content** of what you teach been affected by your increasing computer knowledge?

CI^3 Project Long Term Assessment

Name: ____________________

School: __________________

Instructions for Part 1:
For numbers **1-9** below, please *circle* yes or no.

1. Do you still have, use, or reference the **computer workshop** handouts/materials?
   YES **NO**

2. Prior to the computer workshop, was there an in-school computer interest or support group at your school?
   YES **NO**

3. Following the completion of the workshops, has a computer interest or support group been formed?
   YES **NO**

4. Have you requested that your school or department purchase any software within the last year?
   YES **NO**

5. Do you use the school district's software preview center?
   YES **NO**

6. Do you have a computer in your home?
   YES **NO**

   If you circled **YES**,

   (a) What brand and model is it?

   (b) Do you bring it into the classroom?
   YES NO

7. Do you plan to purchase a personal computer within the next 12 months?
   YES **NO**

8. Does the integration of the computer in education change the priorities of what should be taught in the curriculum?
   YES **NO**

9. Do you feel that you know enough about computers to make effective use of them in your teaching?

YES **NO**

10. (a) List the **names** of the top five computer programs/packages that you use either in your role as an educator or for personal use.

(b) Indicate the **approximate number** of computer programs/packages you use with your classes.

______

(c) Indicate the **approximate number** of computer programs/packages that are for your personal use.

______

11. List the **names** of the top five computer programs/packages (titles) that you use or have used most frequently with your students.

Instructions for Part 2:
Please answer each of the following questions with a checkmark (√) .

1. Before the inservice sessions, how involved were you in integrating computers into your curriculum?

   ___ none ___ slightly ___ somewhat ___ very

2. Since the inservice training, have you increased your involvement in the integration of computers into the curriculum?

   ___ none ___ slightly ___ moderately ___ much

3. Before the training, were you part of a local computer support group?

   ___ Yes ___ No

4. Since the training, have you been involved in starting a local computer support group or become a member of one?

   ___ Yes ___ No

5. Since the inservice sessions, have you increased you communications with others about integrating computers into the curriculum?

   ___ Yes ___ No

   If you checked "yes" to question number 5, please indicate the approximate number of people you have communicated with in each of the following categories:

Approximate Number of People	Categories
________	Shared information with people unaware of how to integrate computers into the curriculum.
________	Exchanged information with people already involved with integrating computers into the curriculum.
________	Contacted other inservice session participants.

6. Have you used any of the materials you received at the inservice sessions?

   ___ Yes ___ No

   If you checked "yes," how useful did you generally find the materials to be? Please check one.

   ___ Useless ___ Hardly useful ___ Somewhat useful ___ Very useful

7. Do you think the type of training you received helps to promote computer integration into the curriculum?

   ___ Yes ___ No

Read Me First

This folder contains MacDraw II files for several instruments that are useful in gathering evaluation data from students and teachers. Vivian Johnson developed these instruments for use in her Ph.D. dissertation work.

Weekly Checklist

Name: ______________________ Week of: ______________________

Day	Teacher Computer Activities						Student Computer Activities										Additional Comments
	Attendance	Grades	Prod. Classroom Materials	Ordering/Previewing. Computer Software	Reading/Studying About Computers	Non Class Related Word Processing	Computer Art	Computer Assisted Instruction (CAI)	Graphing	Computer Literacy	Database Activities	Drill & Practice	Spreadsheet Activites	Simulation	Tutorial	Word Processing	
Mon.																	
Wed.																	
Fri.																	
Week-end																	

Computer Uses for Teachers

Please fill out the following chart to indicate where you use a computer and for what reasons. For each computer application listed on the left:

1) List the number of days per month at each location.
2) Put an "X" under "Personal Use" if you use a computer for any of the application listed for non-school activities.
3) Check (√) each type of curriculum development use for every application used in the classroom.

	Location Days/Months					Instructional Objective					
Types of Software For Instructional Use	In Your Room	In a Computer Lab	At Home	Resource/ Staff P[illegible]	Personal Use	Introduce a Concept	Explore a Concept	Reinforce a Concept	Test	Demonstration	Extra Credit/ Motivational
Database Manager (with Mail Merge)											
Gradebook Program											
Word Processing											
Spreadsheet											
Classroom Materials (Overheads Worksheet Generator Handouts)											
Attendance/ Recordkeeping											
Telecommunications											
Entertainment											

Computer Uses with Students

Please fill out the following chart. For each computer application listed on the left, fill in the following:

1) Estimate the number of days per month you use the computer for each application listed (do not count the number of times used per day).
2) Place an "X" under the heading that indicates how students use the computers.
3) Place an "X" under the heading that indicates how you use the computer in each case.

Note: See example below.

	Location days/month		How Student's Use Computer			How You Use Computer						
Computer Applications	In Your Classroom	In a Computer Lab	Individually	Groups	Whole Class	Introduce a Concept	Explore a Concept	Reinforce a Concept	Test	Demonstration	Extra Credit/ Motivational	Skill Practice
Example: Programming	3	8	x		x	x		x		x	x	
In the above example, the respondent noted: three days per month of programming in the room and eight days per month in the computer lab. Student's use was individually and as a whole class. The instructional ojectives were to: explain a concept, reinforce a concept, demonstration and for extra credit.												
Programing (logo)												
Typing												
Drill-and-Practice Tutorial Simulation Educational Game												
Student Word Processor (Story Writing)												
Database												
Spreadsheet												
Graphing Packages												
Computer Art (Koala Pad)												
Computer Literacy												

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